KRISTOFERSON CREEK FISH PASSAGE IMPROVEMENTS

PRELIMINARY DESIGN REPORT

SNOHOMISH CONSERVATION DISTRCT

Prepared For: Salmon Recovery Funding Board
Project Number: 15-1050
SCD Planner – Kristin Marshall

Prepared By: S Kelly Cahill, PE
Date: July 18, 2016

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INTRODUCTION

The Kristoferson Creek Fish Passage Improvements project, sponsored by the Snohomish Conservation District (SCD), was approved as a qualified project for Salmon Recovery Board (SRFB) funding in December 2015. I was asked by SCD to take lead engineering responsibilities for this project, to which I agreed. The following document outlines the proposed fish passage correction at the two sites.

OVERVIEW

This project proposes to replace two fish passage barriers on public land at the mouth of Kristoferson Creek (WRIA 6) to improve passability for ESA-listed juvenile Chinook and steelhead as well as coho and chum salmon (Fig. 1). The Island County-owned crossings are located on Barnum Road where Kristoferson Creek flows into Triangle Cove (Lower Site; referred to as Barnum Road Crossing on Figure 2) and on Russell Road approximately 500 feet upstream of the mouth of Kristoferson Creek (Upper Site; referred to as Russell Road Crossing on Figure 2) (Fig. 2). Kristoferson Creek is the primary stream in the Triangle Cove watershed; the drainage area is approximately 2,313 acres. The worksites are the lowest crossings on Kristoferson Creek and will improve salmon access to approximately 1.6 miles of stream habitat.

A topographic survey has been completed at the site, and a preliminary design completed for review. Funding was awarded to SCD to complete the design, provide a construction contract package and to manage the installation of two fish passable structures (Design-Build project).

EXISTING CONDITIONS

Kristoferson Creek is a coastal stream on the east central side of Camano Island, WA that supports multiple species of salmonids including fry-migrant Chinook, coho, and stealhead. The stream flows into Triangle Cove, a 225 acre pocket estuary in Port Susan. Habitat conditions within the Kristoferson Creek watershed are modified but not heavily degraded; large woody debris is generally lacking and areas of the riparian corridor are heavily modified. The riparian corridor includes some reaches that are vegetated with native conifer and deciduous trees albeit with narrow buffer widths in many locations. In modified reaches of Kristoferson, the riparian corridor vegetation community is characterized by grass or other non-native vegetation cover that excludes large trees, and some sections of the creek flow through commercial and industrial areas.

The riparian area within the project reach is characterized by moderate to limited forest cover at the upstream end of the project reach, and salt marsh and mixed grasses along the lower portion of the reach. The riparian habitat provides some cover for rearing juvenile and migrating fish, but large wood within the project reach is lacking.

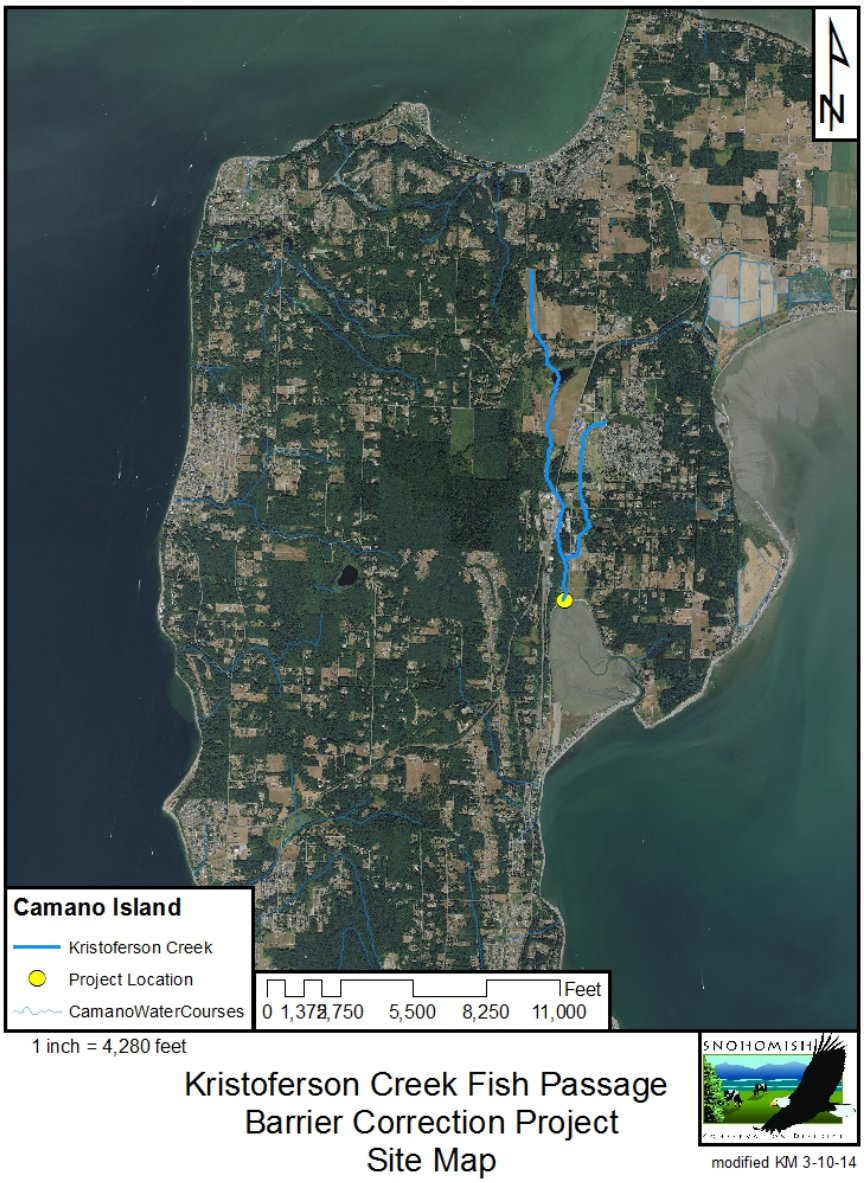


Figure 1: Project Location

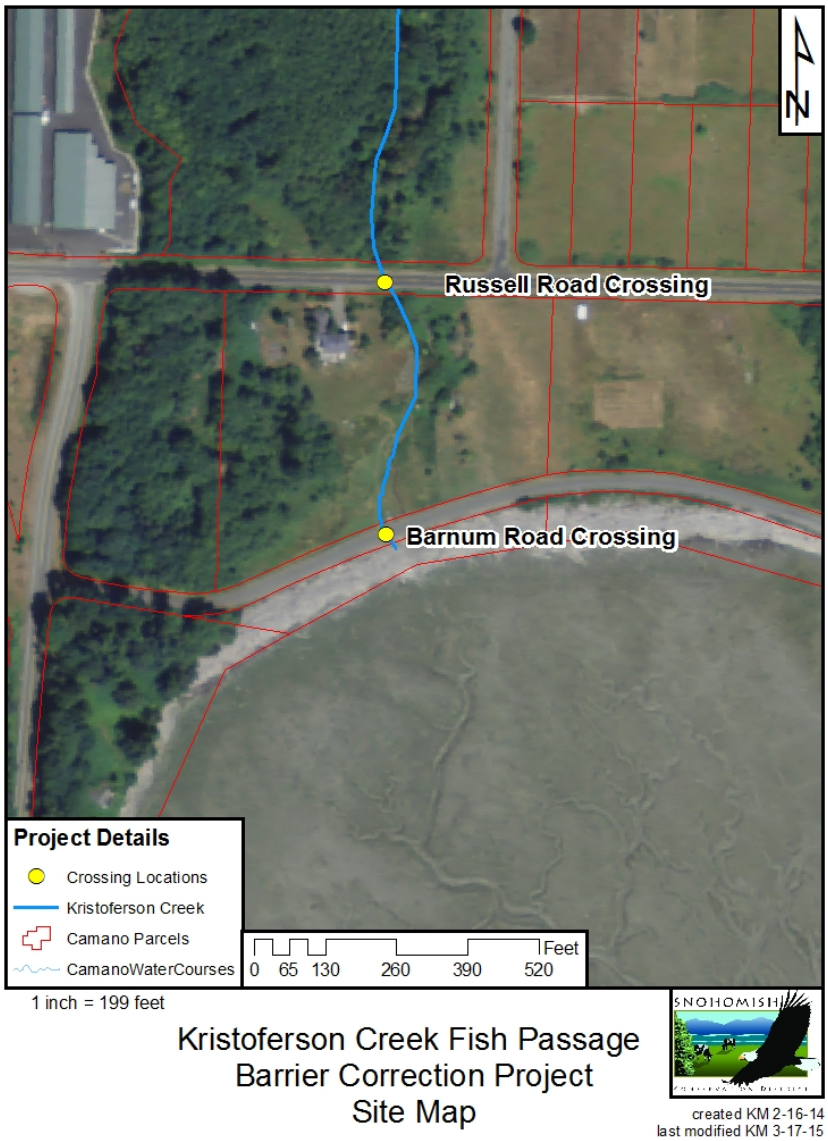


Figure 2: Upper and Lower Sites

FISH PASSAGE BARRIER CROSSINGS

The existing crossing at the Lower Site consists of four 21 inch diameter precast round concrete culverts (approx. 35 feet in length) that lay side by side and are installed at uneven elevations (Figs. 3, 4). The Level A assessment evaluated the culverts a nearly complete barrier to fish except during the upper limit of tidal fluctuations when the tide backwaters the culverts; passability was estimated at 33%. The inappropriate size (undersized) and slope (1.1%) create a

velocity passage barrier for salmon. Additionally, the culverts do not provide adequate water depth and retain no bed material.

The crossing at the Upper Site consists of a 1.25-meter round, corrugated aluminum pipe with no streambed material inside and a slope of 2.5% (Figs. 5, 6). There is a gradual slope change, 14 meters from the downstream end, inside this undersized culvert. A Level A assessment evaluated the culvert at 66% passability.

Figure 3: Existing Culvert Inlets, Lower Site

Figure 4: Existing Culvert Inlet, looking upstream, Lower Site

Figure 5: Existing Culvert Inlet, looking upstream, Upper Site

Figure 6: Existing Culvert Inlet, looking downstream, Upper Site

PRELIMINARY ANALYSES

There was not a stretch of stream between the two crossing locations that has not seen impact from human manipulation. As such, several cross sections were taken across the creek approximately 500 feet upstream of the project area to determine a representative reach. This data was used to determine the Bank Full Width of 9.5 feet.

The basin size at this location is estimated to be approximately 3.62 square miles with a mean annual precipitation of 35 inches, at an approximate elevation of 20 feet above sea level. LIDAR and topographic data in ArcMap were used to derive the watershed boundary.

Basin Map

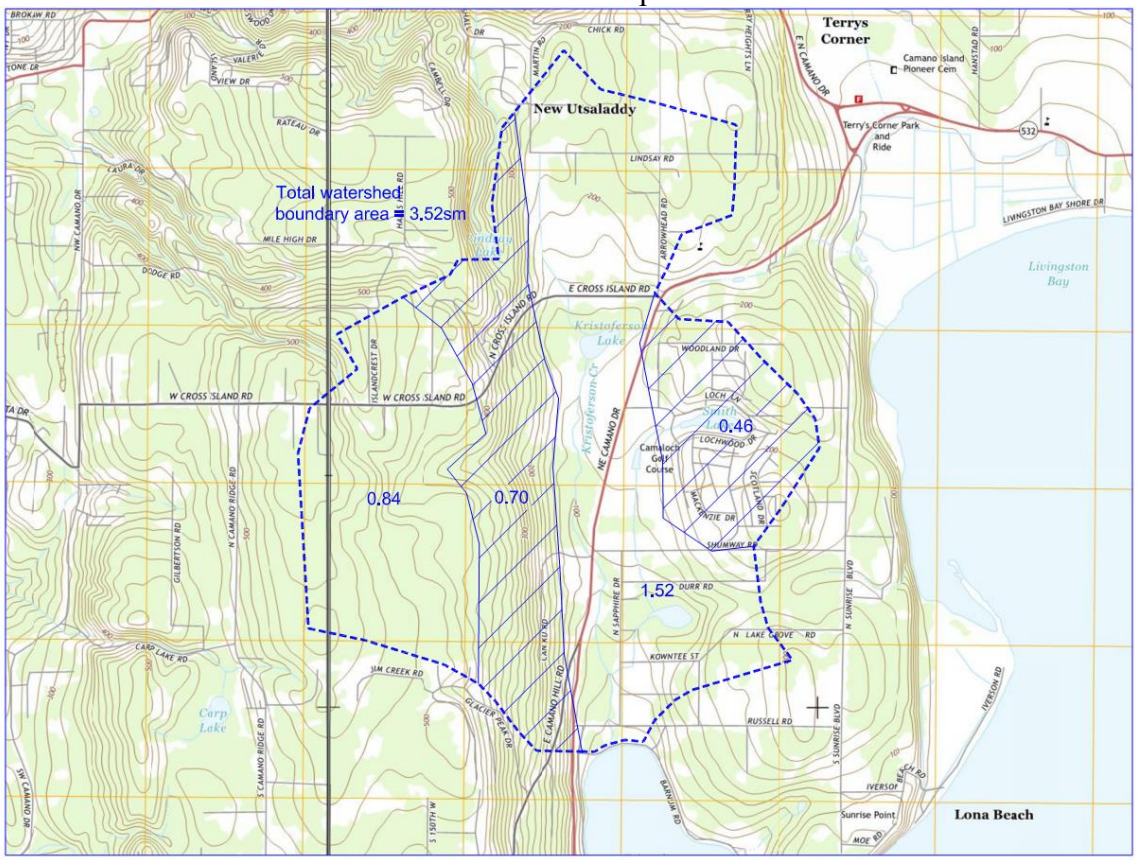


Figure 7: Kristoferson Creek basin map

The following is an estimation of the creek discharge for the following return interval storms, using WWHM2012. The USGS Regression Equation for Un-gaged Rural Watersheds in Washington State was used to verify the data:

Predeveloped Land use Totals for POC #1
Total Area = 2313 Acres
Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	35
5 year	53
10 year	66
25 year	82
50 year	93
100 year	105

Additionally, anticipated stream discharge using WDFW's suggested regression equation for determining fish passage, are as follows:

Description	Discharge (CFS)
January Flow Rate	26
May Flow Rate	7

Average gradient at the project site is approximately 1.1%. The project site appears to be located at an inflection point of the stream, as the grade upstream from the upper site appears to be steeper on average, approximately 1.6%, while downstream to the confluence of Triangle Cove the average gradient at the lower site appears to be 0.5%. An examination of the longitudinal profile suggests that there is a re-grade potential in this stream system. It is likely that this potential will develop as the Lower Site structure allows for a natural connection to the Triangle Cove tidal flat. At the project site, the long profile suggests a re-grade potential up to 1.9 feet. The current stream channel elevation is very near the lower re-grade potential at the Upper Site and approximately 1.8 feet above the Lower Site. Average bankfull width was measured as 9.5 feet.

Water flows were analyzed with HEC_RAS from data exported from topographic survey and LIDAR data. Water surface elevations for Q2 and Q100 flows were derived from HEC_RAS modelling and imported to the Civil3D profiles and site plan.

Tidal flows from Triangle Cove were analyzed through the existing 4 concrete culverts. The maximum tidal flow through the culverts is calculated at 11.3 cfs resulting in a maximum velocity of 1.2fps through each culvert if all culverts are open and operating at the same levels.

PROJECT OBJECTIVES

The objective of this project is to correct two partial fish passage barriers in lower Kristoferson Creek for fry-migrant Chinook, steelhead, and other salmonids. Crossing alternatives are focused on restoring 100% passability for all life stages and fish species using Kristoferson Creek, with an expected secondary benefit of improving stream and tidal processes. Correction of these two barriers will improve access to 1.6 miles of stream habitat. Specific project outcomes are:

- Replace a barrier crossing at Barnum Road and the mouth of Kristoferson Creek
- Replace a barrier crossing at Russell Road, 500 feet upstream of the mouth of Kristoferson Creek

Riparian planting is not included in this project based upon feedback received during SRFB tours in 2014 and 2015.

DESIGN ALTERNATIVES DISCUSSION

Snohomish Conservation District engaged stakeholders and Island County staff throughout the grant application process in 2014 and 2015 to develop a preferred conceptual design for the Upper and Lower sites for the purpose of a final grant application, submitted to SRFB in August 2015 (Appendix A). The preliminary designs proposed in this report revise and advance the 2015 concept designs and incorporate stakeholder comments received during presentations to the stakeholder groups (Island County Salmon Technical Advisory Group, the Island County Water Resources Advisory Committee, SRFB project reviewers, and Island County Council) and multiple on-site meetings County Public Works engineers and WDFW. SRFB review comments are included in Appendix B, along with additional SRFB Forms and a summary of stakeholder review.

During initial conversations (2013/14) with Island County, SCD proposed three conceptual alternatives to correct the two fish passage barriers:

1. Abandon Barnum Road and the Lower Site, and install a 9 ft – 3 in pipe arch at the Upper Site
2. Install a 9 ft – 5 in concrete box culvert at the Lower Site, and install a 9 ft – 3 in pipe arch at the Upper Site (preferred concept alternative)
3. Install an appropriately sized bridge at both the Lower and Upper crossings

Island County immediately communicated two constraints on the design alternatives available for this project owing to capacity and maintenance requirements and public opinion. In 2007/08, project proponents proposed to the County and adjacent community the option of abandoning Barnum Road and the barrier crossing at the Lower Site and completing a near full restoration of the shoreline (with or without some form of low impact public access). At that time, the project alternative received extremely strong negative feedback from citizens and Island County

was unwilling to consider road abandonment. SCD has continued to present the option of road abandonment/full restoration at the Lower Site, and has continued to receive strong feedback that road abandonment is not an option for Barnum Road. During informal discussions in 2014 and 2015 with the surrounding community and a May 2015 presentation to Island County Commissioners, SCD again was told road abandonment will not receive public support or landowner approval.

The second constraint communicated by Island County is that a bridge or bridge-like structure is beyond their maintenance program capacity. As such, any crossing alternative that exceeds a 20 foot span or is a bridge will not receive landowner approval.

Based upon the firm constraints of the landowner and the stakeholder engagement comments and feedback, SCD and Island County have selected alternative #2, the box culvert and pipe arch, as the preferred concept design to advance to a preliminary design. Although this alternative does not provide the highest, best option for ecosystem restoration, it presents the best compromise between political/public feedback and restoration goals. This alternative provides the desired fish benefit (100% passability for all species at all life stages), which is the primary goal of this project, and also incorporates public feedback, and meets landowner requirements for approval.

DESIGN METHOD

The channel characteristics of Kristoferson Creek at the Upper Site are as follows: width of less than 10ft, slope of less than 3%, floodplain utilization of 2.6, channel stability is considered stable, and debris potential is considered to be light. These characteristics lend well to the no-slope crossing design method.

The channel characteristics at the Lower Site change significantly as the channel meanders through the tidal marsh cut off by Barnum Road. The channel width, slope, stability and debris potential characteristics are similar; however, the floodplain utilization exceeds 3.0 which would generally favor the installation of a bridge to allow for meandering in an unconfined channel. However, a bridge is not an option for this site as described above. Owing to these very limiting constraints and given the channel conditions, the no-slope crossing design method for culverts will be used rather than the hierarchical benefits analysis approach for designing tidally-influenced crossings.

PREFERRED ALTERNATIVE – Upper Site

The proposed structure is a 12-foot diameter, 10 gauge, corrugated metal pipe. The existing road embankment, pavement and shoulder widths will remain the same. Total length of the structure will be 66 feet with beveled ends to match the finished fill slope.

The final stream channel is designed using the no-slope method, and will be reconstructed at the grade of 1.1%, as nearly currently exists at the project location. The channel width will be 8 feet, and banks within the structure will rise at 1½:1 slope until intercepting the structure. The

finished channel will be just above the minimum expected re-grade potential, filling approximately 27% of the pipe inlet depth. See the Long Profile, Sheet 4 of 10, in the attached draft plans (Appendix C). The maximum regrade channel would be expected to raise the inlet cover to just under 40%, the maximum allowed under WDFW guidelines for zero-slope installations. Based on the long-profile grades, the finished outlet channel will be initially constructed to the minimum regrade potential, 20% of the outlet depth. The maximum regrade channel would be expected to raise the outlet cover to just under 30%, the maximum allowed under WDFW guidelines for zero-slope installations. Stream simulation rock will be used in a mix that emulates the existing grain size distribution; this mix has yet to be determined.

PREFERRED ALTERNATIVE – Lower Site

The proposed structure is a precast concrete box culvert with an inside span of 12 feet and rise of 6 feet. The structure will be 36 feet long to accommodate Island County road standards for 11-foot lane widths, 4-foot gravel shoulders, and guardrail (Appendix C). Due to the minimal elevation difference between Kristoferson Creek channel bottom and existing road surface, a 12-foot culvert was ruled out as it is not practical to raise the grade of the road high enough to provide adequate cover for a round culvert pipe or pipe arch. A bridge was considered but Island County rejected the alternative in favor of a concrete box structure.

As with the Upper Site, the Lower Site is design using the no-slope method. The final stream channel will be reconstructed to an elevation of 6.30 ft, approximately midway between the expected maximum and minimum regrade channels. This elevation will result in the box culvert counter sunk to 30% of its inside rise, expecting the channel to regrade to just above 20% as the channel regrades toward Triangle Cove tidal flats.

The Engineer Cost Estimates for Upper Site and Lower Site are included as Appendix D.

CONCLUSION

The preferred alternative will accomplish the primary project goal to correct two partial fish passage barriers on lower Kristoferson Creek, to provide access for all fish species at all life stages. The constructed crossings will improve fish access to 1.6 miles of stream habitat.
The assessments and proposals indicated in this report are site specific and are meant for use in conjunction with this project only. Site specific proposals should be developed for any other fish passage enhancement projects occurring within this watershed. For more information about this project, please contact the Snohomish Conservation District.

APPENDICIES

NOTES

Bankful width at this site is approximately 6 feet wide based on measurements and observations made above and below crossing site.

Conserve creek bed materials during excavation for pipe and place into installed pipe to mimic natural stream channel bottom. Stockpile materials to approved locations and treat as required in CS-02 Erosion and Pollution Control construction specification. Locate material storage areas such that drainage from these areas will not enter the work isolation zone.

Install pipe arch as specified by the "Corrugated Metal Pipe Design Guide" by CONTECH Construction Products or pipe arch manufacturer's recommendation.

Work area isolation is to be provided using inflatable bags, sandbags, sheet piling, precast concrete panels or other materials as approved.

A temporary bypass shall be installed to divert water around around the work area prior to work in the wetted perimeter of the drainage. A sandbag revetment shall be placed at the upstream and downstream end of the project to divert the entire flow through the bypass and prevent water from backing into the work area.

A list of equipment, materials and work isolation plan shall be submitted for approval prior to implementation. All pumps shall have fish screens.

De-watering shall be performed to provide reasonably dry construction conditions.

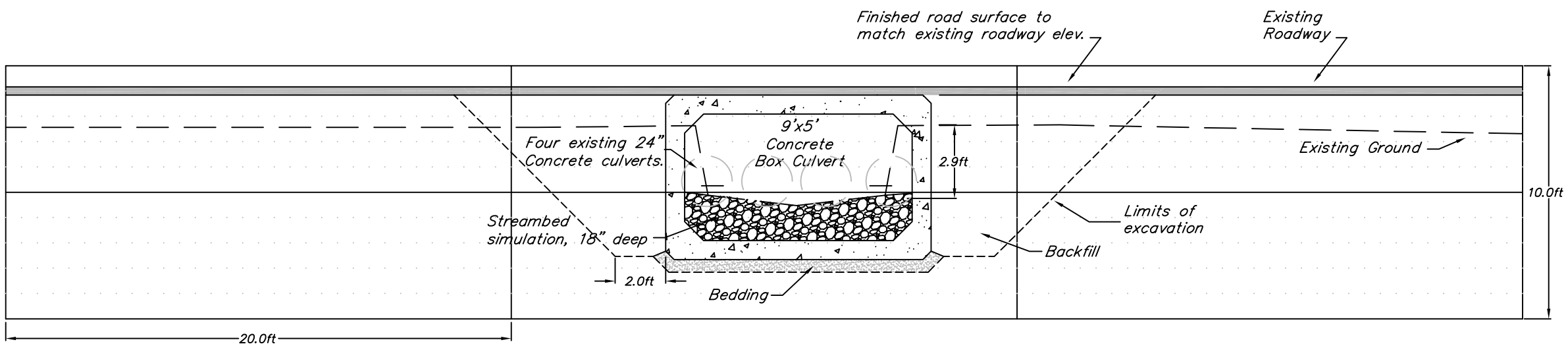
The Contractor shall capture and safely move food fish, game fish, and other fish life from the isolated work site. The Contractor shall have fish capture and transportation equipment ready and on the job site . Captured fish shall be immediately and safely transferred to free-flowing water downstream of the project site.

All damaged or disturbed banks are to restored to a natural slope, pattern and profile suitable for establishment of permanent woody material.

STEVEN KELLY CAHILL
STATE OF WASHINGTON
47400
REGISTERED
PROFESSIONAL ENGINEER

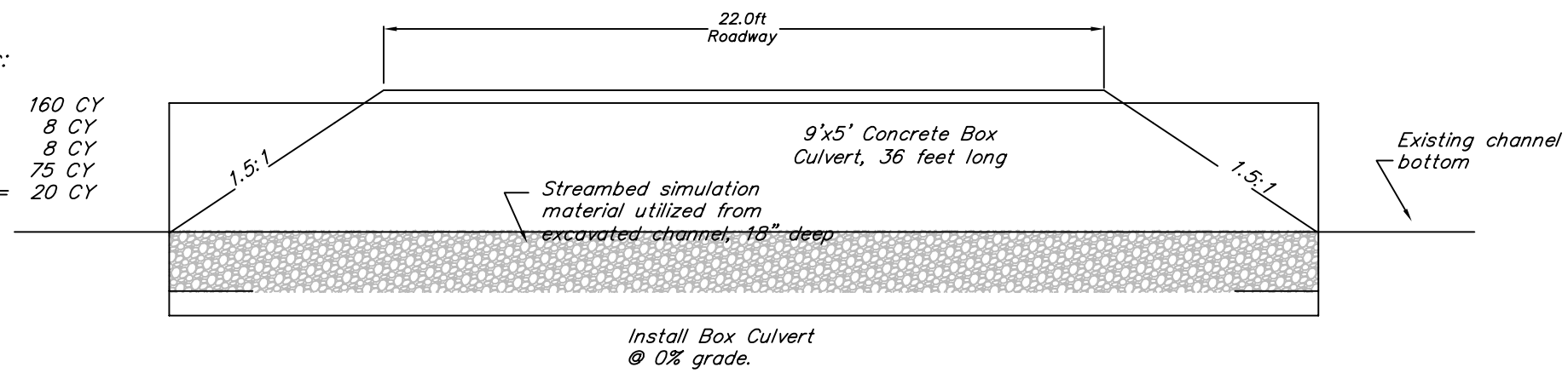
PRELIMINARY

SECTION VIEW



Estimate of Quantities:

Excavated volume =	160 CY
Bedding volume =	8 CY
Backfill volume =	8 CY
Embankment volume =	75 CY
Stream Simulation volume =	20 CY



PROFILE VIEW

DESIGNED SKC DATE 06/2014 APPROVED BY
DRAWN SKC DATE 06/2014 TITLE
TRACED DATE TITLE
CHECKED DATE

WA

Kristoferson Farms
Fish Passage Project - Lower Crossing
SNOHOMISH COUNTY,

USDA NATURAL RESOURCES CONSERVATION SERVICE
SNOHOMISH CONSERVATION DISTRICT

REVISION NO. 1
DRAWING NO. CrossSection1.dwg
SHEET 2 OF 2

NOTES

Bankful width at this site is approximately 8 feet wide based on measurements and observations made above and below crossing site.

Conserve creek bed materials during excavation for pipe and place into installed pipe to mimic natural stream channel bottom. Stockpile materials to approved locations and treat as required in CS–02 Erosion and Pollution Control construction specification. Locate material storage areas such that drainage from these areas will not enter the work isolation zone.

Install pipe arch as specified by the "Corrugated Metal Pipe Design Guide" by CONTECH Construction Products or pipe arch manufacturer's recommendation.

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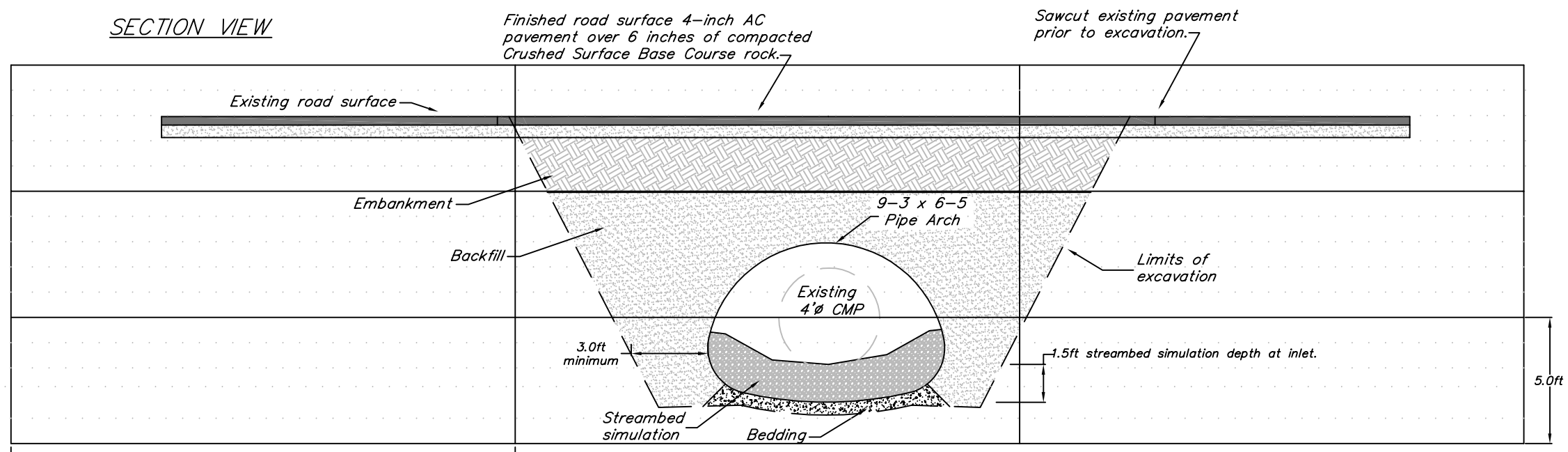
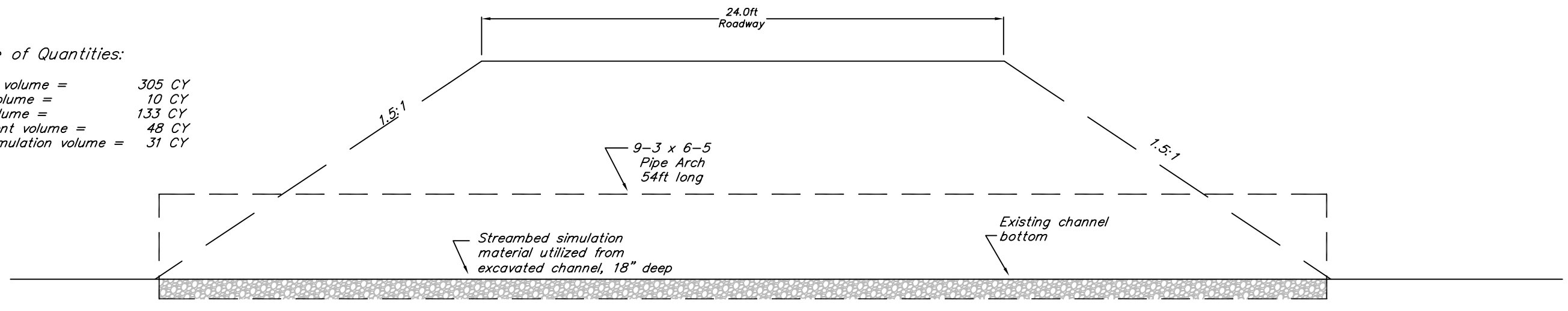
PRELIMINARY

SECTION VIEW



Estimate of Quantities:

Excavated volume =	305 CY
Bedding volume =	10 CY
Backfill volume =	133 CY
Embankment volume =	48 CY
Stream Simulation volume =	31 CY



PROFILE VIEW

DESIGNED SKC DATE 06/2014
DRAWN SKC DATE 06/2014
TRACED DATE
CHECKED DATE
APPROVED BY
TITLE
TITLE

WA

Kristoferson Farms
Fish Passage Project – Upper Crossing
SNOHOMISH COUNTY, WA

USDA NATURAL RESOURCES CONSERVATION SERVICE
SNOHOMISH CONSERVATION DISTRICT

REVISION NO. 1
DRAWING NO. CrossSection1.dwg
SHEET 1 OF 2

Salmon Recovery Funding Board
Individual Comment Form

Lead Entity:	Island County
Project Number:	14-1074
Project Name:	Kristoferson Creek Fish Passage Barrier Correction
Project Sponsor:	Snohomish Conservation District
Grant Manager:	Mike Ramsey

	Date	Status
Draft Application Review/Site Visit	4/8/14	**Reviewed**
Post Application		
Final		

Early Application Status Option	
REVIEWED	SRFB Review Panel has reviewed and provided comments.
Post-Application & Final Status Options	
NMI	Need More Information
POC	Project of Concern
CONDITIONED	SRFB Review Panel has applied conditions
CLEAR	Project has been reviewed by SRFB Review Panel and is okay to continue in funding process

PROJECT SUMMARY

The project proposes to design and construct a new culvert to replace four undersized culverts under Barnum Road, which currently create a partial barrier to juvenile salmonids migrating between Triangle Cove and upstream rearing habitat in Kristoferson Creek. The project may also do riparian planting along the creek, pending agreement by the landowner.

Salmon Recovery Funding Board
Individual Comment Form

WASHINGTON STATE RECREATION AND CONSERVATION OFFICE
Salmon Recovery Funding Board

DRAFT APPLICATION REVIEW AND SITE VISIT – REVIEW PANEL COMMENTS

Date: 4/10/14

Panel Member(s) Name: Slocum and Powers

Early Project Status: ☒ Reviewed

Project Site Visit? ☒ Yes ☐ No

1. Recommended improvements to make this a technically sound project according to the SRFB's criteria.

Not enough information is included in the PRISM project file at this stage to evaluate the technical merits of the proposed project design. It would be helpful to include a copy of the 2008 design that was prepared by Adopt a Stream Foundation. The barrier evaluation form (BEF) and correction analysis form (CAF) that are included in the file are incomplete and would be improved with further detail. In particular, only one design alternative is listed in the CAF, and no supporting drawings or other design data is included. Without this design data, it is impossible to verify whether the proposed construction budget will be adequate. Some design issues that should be considered include determining specific and quantifiable restoration objectives such as what flow velocities, depths, and ranges of tidal inundation are optimal for juvenile Chnook; transport of drift wood; shading and riparian vegetation; and other factors that affect suitability of habitat for juvenile Chinook salmon. Will the culvert design be based solely on correcting the fish passage barrier, or on a more expansive objective of restoring the marsh ecology at the mouth of the creek? If the latter, would a prefabricated bridge be more cost effective than a large box culvert?

Please consider correction of the Russell Road culvert barrier as part of the overall program for restoring passage into Kristoferson Creek. If fish passage conditions at the Russell Road culvert are worse than at the Barnum Road culverts, then it might be preferable to correct the Russell Road culvert first.

To demonstrate the potential benefits of the project, it would be helpful to include the data from the 2013 study on juvenile Chinook presence in Whidbey Basin non-natal streams, which was referenced in the proposal. What was the relative abundance of juvenile Chinook that was measured in Kristoferson Creek, relative to other non-natal creeks in the basin? Does the data indicate that the Barnum Road culverts actually interfere with juvenile Chinook passage into the creek?

Landowner acknowledgment forms from both Island County DPW and the private landowner must be included in the final application. The proposal would be strengthened at this stage by including some documentation from DPW and the landowner that they are aware of and support the proposal.

2. Missing Pre-application information.

A "Project Proposal" using the form in Manual 18, Appendix C must be completed in included in the PRISM file for this application. Landowner acknowledgment forms from both Island County DPW and the private landowner must be included in the final application.

3. Comments/Questions:

The sponsor might find it helpful to contact Dan Vekved of San Juan County DPW to hear his experiences with the design and permitting of SJCDPW's "Point Lawrence Road/Cascade Creek Culvert Repalcement" barrier correction project at Buck Bay on Orcas Island (SRFB Project No 07-21539). This SRFB-funded project was in a similar geomorphic setting and had similar design constraints as the proposed work on Kristoferson Creek.

4. **Staff Comments:**
   The review panel comments correctly identify a few items needed in the application to make this project eligible:
   1. The Salmon Project Proposal needs to be completed and attached. The current attachment is a blank template.
   2. A Landowner Acknowledgable Form from adjacent property owner will be needed if work is proposed on their property.
   3. A complete barrier evaluation form (BEF) and correction analysis form (CAF) needs to be attached.

EARLY APPLICATION REVIEW AND SITE VISIT – LEAD ENTITY AND PROJECT SPONSOR RESPONSES

Directions: **By the final application due date**, applicants must revise their project proposals using "track changes" and update their PRISM applications and attachments, as needed, to respond to the review panel comments. In addition, please fill out the section at the end of the project proposal which asks how you responded to the review panel's comments.

Special Note: To help speed the local and SRFB Review Panel evaluation process, if for any reason throughout the application review process you update your project proposal based on SRFB Review Panel comments please update your project proposal using WORD "track changes" and re-attach your proposal in PRISM. This step will save time and focus the reviewer on the changes.

POST APPLICATION – REVIEW PANEL COMMENTS

Date:

Review Panel Member(s) Name:

Application Project Status: **None**

1. **If the project is a POC, identify the SRFB criteria used to determine the status of the project:**

2. **If the project is a POC, what changes would make this a technically sound project according to the SRFB's criteria?**

3. **If the project is Conditioned, the following language will be added to the project agreement:**

4. **How could this project be further improved?**

5. **Other comments:**

POST APPLICATION – LEAD ENTITY AND PROJECT SPONSOR RESPONSES

Directions: All projects will be reviewed at the September 22-25 review panel meeting. A status will be assigned to each project by October 4, 2014. **By October 15**, applicants of projects assigned a status of Project of Concern, Conditioned, or Need More Information, must update their project proposals. Please "accept" all current track changes in the project proposal so you are starting with a clean proposal. Then please turn track changes back on when you make new changes. This step will save time and focus the reviewers on the changes.

In addition, please fill out the section at the end of the project proposal which asks how you responded to the review panel's comments.

FINAL REVIEW PANEL COMMENTS

Date:

Panel Member(s) Name:

Final Project Status: Choose an item.

1. **If the project is a POC, please identify the SRFB criteria used to determine the status of the project:**

2. **If the project is Conditioned, the following language will be added to the project agreement:**

3. Other comments:

Salmon Recovery Funding Board (SRFB) 2014 Grant Cycle
Island County – Pre-Application Evaluation Form

Project Name: Kristoferson Creek Fish Passage Barrier Correction

Sponsor: Snohomish Conservation District

Proposal summary: Replace improperly sized and place culverts with larger fish passable culvert/bridge

Summary of strong points:

- Straight forward project with clear benefit to Chinook
- Looking at whole reach
- Clear benefit to salmon
- Potential for additional improvement of the Russell Rd site
- Planting project increases habitat value
- This project will allow fish access to the lower, tidewater section of Kristoferson Creek, which will potentially benefit juvenile Chinook.
- There will be substantial additional benefit to other salmon species by improving access to upstream spawning habitat.
- Current culverts are owned by Island Co.
- Likely technically simple to implement.
- Replace fish barrier culvert will improve fish passage for all life stages of salmonids.
- Fish passage
- Kristoferson culvert on Triangle Cove potentially will provide rearing for ESA listed species, out-migration for the Stilly and Skagit Rivers. Overall cost $148K excellent!
- Very high likelihood of success. If designed correctly will also increase/enhance salt marsh habitat adjacent to creek.
- First physical step to restore the creek for significant fish passage.
- Attentive, positive basic land owner.
- Reasonable funding requirement.
- Corrects long standing partially blocking barrier for fish passage. Cumulative data support importance of small streams for juvenile salmonid rearing. K. Creek has shown high usage. Additional benefit of public education if adult salmonid (which public can view) have unimpeded access for spawning. Public support for efforts in K. Creek/Triangle Cove. 10 acres, just upstream and on both sides of the stream, already preserved by IC and WCLT, with additional stewardship by Friends of Camano Island Parks (FOCIP). In Area 1, with fish use from both the Stilly and Skagit Rivers. Connects to 200 acres of estuary which connects freely to Port Susan and has never been totally diked.

Summary of weak points:

- Should not remove a bridge as a possible alternative
- Potential issues with upland property owner.
- May need additional neighbor outreach or interpretive information for the public to avoid conflicts
- Project addressing small part of a larger restoration need (i.e. removal of Barnum Rd culvert as well). Discussion of bigger project feasibility, perhaps longer-term (i.e. after a landowner change to the north) would improve.
- Privately owned land along the creek between Barnum and Russell Roads may limit the restoration of salt marsh and tidewater habitat.
- Culvert sizing will be determined as part of the design process, but what if a bridge is deemed necessary? It sounds like a bridge is a no-go with the County.
- Any risk to septic system on the upstream property?
- Upstream property owner wants to minimize transport of LWD upstream of road. Any properly sized culvert is intended to transport debris it is likely to encounter as well as fish.
- Unclear how supportive adjacent property owner is to increasing duration of tidal flooding onto his property. This could preclude much improvement in estuarine restoration.

Other questions, concerns, and/or suggestions **to be addressed in full application (examples: costs; benefit to fish; are appropriate partnerships developed?; is the project technically sound; is the approach proven?)**

- You **should** pursue the potential for a bridge at the site in addition to culvert options. The cost of a 16 ft culvert seems like it would be more than a bridge. Look into potential woody debris barriers to prevent upland wood movement. You may want to place some wood in the intertidal area anyway
- It might be a good idea to include the design of improved fish passage at Russell Rd. in this stage of the project because of their close proximity (~300 ft.). There would be a synergistic benefit to doing both and it may be more economical to have both designed at the same time. It would help to ensure that the Russell Rd. passage would happen and would avoid overlap or repetition of feasibility assessments, saving both time and money.
- Also recommend including design of assessment procedures (salmon presence and density) before and after implementation.
- Buy out property owner, abandon road and restore natural connection. Bridge is next best solution. If culvert is to be used it needs to be sized to pass LWD.
- Project needs to max out estuarine restoration to benefit juveniles as well as adult salmon.

Clarity of Proposal

- Straight forward but need to clarify if Russell road culvert is within the scope of work
- Proposal uploaded to prism has not been filled out.
- Good

Project scope – appropriateness as described to meet stated goals and objectives?

- Fine
- Proposal uploaded to prism has not been filled out.
- Rather see total removal.
- Adjacent property owner, Ric Shallow, needs to be involved at all stages of planning.

Sequence - Is the proposal in the correct sequence of any preceding actions?

- Fine
- good

Local support - **Does the project have demonstrated local support? If not, what needs to happen to solidify? What local community concerns might impact success of project?**

- Need to ensure upland property owner's concerns are addressed
- Yes the landowner of the tidewater section of the creek has been consulted. Further development of this relationship is important to the ultimate success because enhancement of the stream bank and salt marsh area is necessary to fully realize the fish benefit.
- Unclear.
- The Kristoferson's support the activity.

Salmon Recovery Funding Board
Individual Comment Form

Lead Entity:	Island County
Project Number:	15-1050
Project Name:	Kristoferson Creek Fish Passage Improvements
Project Sponsor:	Snohomish Conservation District
Grant Manager:	Mike Ramsey

	Date	Status[1]
Post-Application		
Final		

PROJECT SUMMARY (*for Review Panel reference only*)

This fish passage restoration project will result in improved fish passage by removing two partial barriers to fish passage along Kristoferson Creek where it crosses Barnum Road and Russell Road. These crossings are located on the first 500 feet of Kristoferson Creek where the creek flows into Triangle Cove. The existing crossing at Barnum Road consists of four undersized round concrete culverts that lay side by side and are installed at uneven elevations. The Russell Road crossing consists of a single 4 foot round steel pipe. This project will build on a feasibility study conducted in 2008 by AdoptaStream Foundation assessing crossings and fish passage improvement opportunities on Kristoferson Creek. By replacing the fish passage barriers, the project will improve fish passage for endangered Chinook salmon and steelhead. The 2013 "Juvenile Chinook Salmon Rearing in Small NonNatal Streams Draining Into The Whidbey Basin" (Beamer et al) documented lower Kristoferson Creek as providing nonnatal rearing habitat for endangered Chinook salmon (fry migrant Chinook); the report also documented other species use for rearing including chum, coho (species of concern), steelhead (threatened), and cutthroat trout. These passage barriers are the first barriers on Kristoferson Creek and are the highest priority barriers within the subbasin for providing access for juvenile fry migrant Chinook salmon. The project will restore full fish passage to 1.6 miles of the creek. The project is located on Camano Island and is publicly owned. Grant funding is needed to design, permit, and construct the two improved crossings.

The project is different than version proposed in 2014 because it addresses two fish passage barriers on the lower creek instead of one.

FINAL REVIEW PANEL COMMENTS

Date: **Final Project Status:** Choose an item.

Review Panel Member(s):

1. **If the project is a POC, please identify the SRFB criteria used to determine the status of the project:**
2. **If the project is Conditioned, the following language will be added to the project agreement:**
3. **Other comments:**

POST-APPLICATION REVIEW PANEL COMMENTS

Date: **Project Status:** Click to choose a status

[1] CLEAR: Cleared to proceed; CONDITIONED: Cleared to proceed with a condition; NMI: Needs More Information; POC: Project of Concern; NOTEWORTHY: Exemplary Project

Salmon Recovery Funding Board
Individual Comment Form

WASHINGTON STATE RECREATION AND CONSERVATION OFFICE
Salmon Recovery Funding Board

Review Panel Member(s):

1. **If the project is a POC, identify the SRFB criteria used to determine the status of the project:**
2. **If the project is a POC, identify the changes that would make this a technically sound project:**
3. **If the project is Conditioned, the following language will be added to the project agreement:**
4. **General comments:**

SPONSOR RESPONSE INSTRUCTIONS:

If your project is not cleared (i.e. has a status of NMI, Conditioned, or POC) you must update your proposal, PRISM questions, or attachments as necessary to address the review panel's comments. Use track changes when updating your proposal. Fill out the section at the end of your project proposal to document how you responded to comments.

DRAFT APPLICATION / SITE VISIT REVIEW PANEL COMMENTS

Date: April 8, 2015 **Project Site Visit?** ☒ **Yes** ☐ **No**
Review Panel Member(s): Schlenger and O'Neal

1. **Recommended improvements to make this a technically sound project according to the SRFB's criteria.**

   Restoration of full fish access to Kristoferson Creek by addressing both partial barriers in the lower creek will provide access to good rearing habitat for juvenile salmon. The sponsor is strongly encouraged to revisit the calculations for the size of structure needed at both crossings. At the Russell Road crossing (upper), the width of the stream appeared larger than reported. In particular, there are two channels of flow joining at the top of the culvert: one running along the road embankment to east and the main creek channel to north. At the Barnum Road crossing (lower), the site is tidally influenced; therefore a wider opening should be considered than estimated using the WDFW design guidelines for freshwater streams. As noted in the 2014 review panel comments, better technical insights for the design width of the culvert and channel would include an evaluation of natural tidal channels draining similarly-sized watersheds/marsh complexes. The attachment in the PRISM file of SRFB Project 09-1468 Skagit Bay Nearshore Restoration Design titled "Reference Site Evaluation 5-11" document several such reference channels in Island County. Design studies such as Williams et al. 2002 "Hydraulic Geometry and Geomorphology Design Tools for Tidal Marsh Channel Evolution in Wetland Restoration Projects" and WDFW 2014 "Marine Shoreline Design Guidance" are also helpful. The sponsor is encouraged to consult with the WDFW Area Habitat Biologist and others at WDFW to clarify the agency's expectations for channel sizing.

   In addition to the comment above leading to potential changes in the design, the sponsor described a design-build process that included the evaluation of three alternatives to select a preferred, then community outreach. The proposed budget does not appear sufficient for the A&E portion (alternative development, selection, outreach, and design), nor for constructing what is expected to be larger structures than conceptually shown in diagrams included in application materials.

   The sponsor is encouraged to evaluate a range of alternatives beyond just a culvert solution, particularly at Barnum Road. Based on application material and the site visit discussion, there appears to be an opportunity to transition the road crossing to a pedestrian-only crossing, i.e., no vehicular crossing.

   Although the proposed construction sites are both on county right-of-ways, the land between them is privately owned. The proposed project would change the inundation patterns on the property, including the delivery of more drift wood. The sponsor is strongly encouraged to maintain the dialogue with the landowner and ensure

any of their concerns are known and there are no surprises for the landowners in terms of expectations for how a restored site would change over time. Since the proposed project would increase inundation on their property, a conservation easement for the estuary could add certainty to the project's long-term success and financially compensate the landowner. In terms of addressing the concern from the landowner to manage wood transport and flooding of their property, additional cover elements (strategic wood placements) on the upstream site of the Barnum Road culvert may serve the dual purpose of providing cover and preventing addition wood from moving upstream.

There is a small number of treated wood piles just upstream and west of the Barnum Road culverts. It would be beneficial to remove those, if possible, although it may require different equipment than would be on-site for the crossing restoration.

2. **Missing Pre-application information.**

3. **General Comments:**

Please correct the culvert diameter information for the four pipes at Barnum Road. The diameter is wider than the 12 inches stated in the application.

Staff Comments:

SPONSOR RESPONSE INSTRUCTIONS:

Revise your project proposals using "track changes" and update any relevant PRISM questions and attachments. Fill out the section at the end of your project proposal to document how you responded to comments.

2015 Island County
SRFB Project Comments

Reviewers present:

- Todd Zackey
- Dan Matlock
- Rick Baker
- Tess Cooper
- Rob Hallbauer
- Jamie Hartley
- Paul Marczin
- Barbara Brock
- Gary Ehrenfeld
- Russ Holmes
- John Lovie
- Jim Somers
- Carol Gillespie
- Dave Thomas
- Julius Budos
- Don Lee
- Al Williams

Guests

- Mike Ramsey (RCO)
- Jennifer O'Neal (Tech Review Panel)
- Paul Schlenger (Tech Review Panel)
- Suzanna Stoike
- Anna Toledo
- Matt Zupich

Kristoferson Creek Fish Passage Barrier Correction

Concern about community willingness of road abandonment option. Community is not likely to be very supportive.

"Need to establish upstream bankful width above Russel road to establish proper culvert size. Need to address and do some research on the appropriately sized culvert to address tidal exchange on Barnum Road."

"The small stream project only sampled approximately 300 feet up from mouth of Kristoferson Creek other sampling further upstream in Kristoferson Creek only found Coho. You need to justify why replacement of the [1]culvert at Russell road is important for Chinook and salmon recovery."

"It would be beneficial if this project also helped with small stream restoration throughout the Whidbey basin by perhaps working with other agencies to help develop culvert specs for culverts that are in intertidal areas for fish passage and tidal exchange."

"Project is well conceived, scoped appropriately and has a design that is a good balance between habitat restoration, neighborhood concerns (no road closure), County concerns (no bridge & no drift logs clogging the culvert) and property owner concerns (no driftwood or large buffer restoration)."

Iverson Marsh Stakeholder Integration

"Lessons learned here will be invaluable in dealing with other beach communities going forward."

"The applicant needs to incorporate more information and coordination with FEMA, do home owners have FIRM insurance? There is potential if home owners have flood insurance that their rates could be lowered as a result of the project."

"I believe the proposed go slow approach is the only one that has a chance in resulting in an eventual project. This will be a very difficult balancing act."

"Beyond the neighborhood, I think surveying the public currently using the site access is critical. Anecdotally, it appears that most of the public is there for the beach. If so, a design moving the parking away from the houses while maintaining or improving beach access might have the best chance for neighborhood and public support. Effective traffic control on the roadway will be a major concern as well. Speed bumps and those electronic signs which let me know I'm speeding might do the trick."

"Unless there are physical reasons why it is not feasible, I believe the ultimate goal should be to restore as much of the area to saltmarsh and tidal sloughs as possible. Drainage concerns (mosquitoes, drainfield operation) and public access to habitat other than the beach certainly must be adequately addressed, but maximum juvenile salmon habitat restoration should be the goal. Based on experience with my own neighbors in talking about restoration, the question of mosquito breeding in salt marshes and any drainage ditches needs to be nailed down."

Camano Island State Park Lagoon Reconnection: Feasibility and Preliminary Design

"Camano Island State Park: State is currently removing three front end loader buckets of coarse drift per day from the updrift side of the boat ramp and dumping it on the downdrift side. Hard to believe there's enough flow to keep a channel open against this onslaught, especially as the state does not want to do any maintenance. This looks like a Perego/Crockett/Swantown - a naturally closed off pocket estuary. Gain is too questionable to risk any loss of recreational opportunity which helps people feel connected to the sound and its life.

Once again, I believe this project is inappropriately titled. Perhaps it once had a surface water connection to Saratoga Passage, perhaps not. But the put the word Reconnection in the title implies that we know or strongly suspect it was once connected and available for use by juvenile salmonids. That is misleading and the project should be given a new title.

Consistent with that concern, the project summary is also inappropriate in my opinion. A change in project scope is needed. This project should start as a feasibility study with the goal to determine whether or not the lagoon was ever connected to Saratoga Passage as the first question to be answered before considering designs. This was the approach at Swantown and I believe is appropriate here.

I say this because I think we should carefully consider whether or not we want to support, or give high priority to, projects which create habitat as opposed to those which restore habitat. Habitat creation projects are usually working against physical forces and require a lot of maintenance to keep them functioning effectively if at all. Absent big changes in the surrounding physical environment, appropriately designed restoration projects should need minimal maintenance. If we don't know which this is (creation or restoration), how can we honestly evaluate it?

It is important to proceed with this project very carefully as it will unavoidably get tremendous public exposure. A failed project would be a big, big deal."

"Relative to the Camano State Park proposal: my recollection is that two holes or so had been dug for another effort and it was found that there was evidence that the lagoon was connected at some time. What removed the connection is unknown and the challenge is to not only restore it but to create something that will endure - not easy."

"I would like to know more about the two holes that were poked for archaeological studies. My first concern is that archaeologists are looking into holes for different reasons than to evaluate whether someplace was a salt marsh or not, so their methodology might not be appropriate to the question of whether the wetland had a surface connection to Saratoga Passage. So, was the material evaluated as to the nature of the peat regarding its origin and the time of its formation? That is, did they evaluate its age (often possible with volcanic material layers found in peat if old enough), its species composition, and was there evidence of peat right at the beach berm implying a surface water connection? Paleoecologists are the folks to ask these questions of. If there is not some information about age and location of a channel, then all we have is that there was a salt marsh there, which frankly, you could reasonably surmise without digging a pit. It does not necessarily follow that the salt marsh was connected to Saratoga Passage before human alterations began. Many salt marshes adjacent to the Salish Sea were not connected in the recent past, having closed off through natural processes long ago. For instance, there is a salt marsh at Swantown Lake on the west side of Whidbey, and an evident salt marsh at Crockett Lake, yet I do not think many people would argue that they were connected via a surface water channel in the recent past.

A feasibility study should concentrate on whether or not a surface water connection was the most recent condition before the modification of the site.by humans.

After that, then it would be appropriate to make a decision on design, informed by a conclusion of whether or not the salt marsh was connected or not.

I am not arguing against the project, I am just disturbed by what I see as creeping assumptions.

Given the very public visibility of this proposed project, failure would be a really bad thing."

Greenbank Marsh Restoration Issues Assessment

"North Bluff Road: Community involvement is present. Studies should go ahead."

"Concern that some potential issues between the different home owner groups may undermine this project going forward. Conservation District should probably contact SRSC for some info about the restoration evaluation at the site."

"I have a concern with the Greenbank proposal. At the time of the site visit, it became apparent that homeowners in the adjacent home owners association were not aware and any proposal, and there was a possibility there was a conflict over ownership of the tidelands where the project outfall was proposed. It seems these issues need to be addressed."

> "I agree with ___. There seem to be several homeowner groups and they don't seem to be on the same page."

"It wasn't overt nor stated, but I suspected there was a subtle caution indication that the proponents weren't citing majority opinions. All stakeholders need to be heard. The salmon habitat value seems to be a positive factor if verified to be cost effective. One thing I've failed to catch up on is the source of funding for all of these projects. If stakeholders like the tribes are major contributors, our view could be different in terms of cost effectiveness than if the funding is mostly from property taxpayer pockets."

"It is my understanding that the community that owns the subject property is mostly on board. That community is up on the hill but happens to own the parcels where the project is proposed as well as having the responsibility to maintain the failing tidegate/drainage on their property (which serves drainage needs for a larger area than just their property). The person on site who was objecting to not being consulted owned a property north of the properties where the project is proposed and does not have an ownership interest. The beach properties to the south also do not have an ownership in the subject parcels.

Given the location of the proposed project with other adjacent owners of beach properties to the north and south, certainly the people to the north and south will need to be consulted, but I think the project proponents are right to not invite the surrounding neighborhoods (who again, do not have an ownership interest) into the process at this point. It is early in the process and there is plenty of time and

opportunity to engage the neighborhood without an ownership interest about their concerns. I believe the aphorism is "too many cooks spoil the broth", at least this early in the process. Baby steps."

"The HHE Greenbank project is in need of the information that would be generated by the proposal in order to have an informed conversation with neighboring homeowner groups.

The requesting HHE homeowners group has been cautious in engage its own members first before expanding the discussion. As a member of the committee, I can say the committee intends to work through (and possibly model) an inclusive, cautious and proactive dialogue with stakeholders.

Recognizing the potential hazards along the way, this committee started with its own property owners especially including those who were instrumental in derailing a project several years ago. The committee has been in dialogue with these key individuals and has secured a "cautious lack of objection" to the proposed grant activities and long-range possibilities that may develop.

As the project moves forward, the Committee will be as deliberate in its dialogue with the expanded circle of stakeholders as they have been with the HHE homeowners.

The grant proposal is essential to providing sufficient facts and options for constructive dialogue rather than allowing old feelings, misperceptions and possibly incorrect assumptions to drive the discussion.

Stakeholder buy-in is clearly a major concern, given the experience with Iverson and Dugualla, and Ken's interjections at the site visit – if the committee and homeowners' association play it right, with the help of this grant, this is a project that may overcome some of those barriers and set the tone for future successes."

"I'm a little confused on this one. The written proposal discusses emphasizes the potential restoration of some 20 acres of lagoon/salt marsh on both sides of the County road, yet the onsite presentation seemed to minimize this potential. Clarification is needed.

I understand this will quite possibly be a two stage project, or that perhaps it will never be more than a small project on the east side of the County road, but this needs to be spelled out more clearly. Particularly, I would like to see a commitment that, at this initial stage, no channel culvert or tide gate design will be considered that precludes eventual restoration of the existing freshwater wetland on the western side of the County road back to its original status as a lagoon/salt marsh."

"I'm not aware of any conflict over ownership of the tidelands where the project outfall was proposed. This grant proposal does not include any proposed outfall yet, as it is a feasibility study which includes soliciting input from all affected neighbors. The preliminary drawings that were done as part of the Alternatives Analysis and Conceptual Design Report show some proposed outfall channels, all well within the property boundaries of the Greenbank Beach & Boat Homeowners Association.

The Greenbank Beach proposal includes a significant community outreach effort, and follows a lengthy process of outreach and involvement from the Greenbank Beach & Boat Homeowners Association. A survey of their membership has shown 87% support for proceeding with this feasibility study. As owners

of the subject parcels and the stormwater conveyance infrastructure, they are responsible for whatever happens with this property, and they have demonstrated a willingness to explore the possibility of including salmon habitat restoration in their plans.

The Greenbank Beach proposal includes specific provisions "to carry out a stakeholder outreach program to gain input on the interests of the various stakeholders who would be affected by a restoration project and to lay the groundwork for addressing those interests in a subsequent design phase of the project", and states further that community concerns will be documented and considered in the revised Alternatives Analysis and Conceptual Design Report that will result from this project.

It should also be noted that most of this year's proposals will have potential impacts to neighboring property owners. While the Greenbank Beach project could impact neighboring properties, isn't that also true of the Iverson Spit proposal? Are all of the homeowners on Iverson Spit aware of the current grant proposal? Do all of the neighbors of Kristofferson Creek know about that proposal at this time? Might there be neighbors who aren't fully aware of what's being proposed? Simply because we've documented one individual who was unaware that this study and outreach effort has been proposed, should we assume that there will be opposition?"

Island County Culvert Prioritization Assessment, Area 2

"The Barrier Inventory Project incorrectly identifies coho as covered under the endangered species act as a species of concern in the table on page 2. Species of concern do not receive any protection under the ESA. The U.S. Fish & Wildlife definition for Species of Concern is:

> "An informal term referring to a species that might be in need of conservation action. This may range from a need for periodic monitoring of populations and threats to the species and its habitat, to the necessity for listing as threatened or endangered. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing. A similar term is "species at risk," which is a general term for listed species as well as unlisted ones that are declining in population. Canada uses the term in its new "Species at Risk Act." "Imperiled species" is another general term for listed as well as unlisted species that are declining."

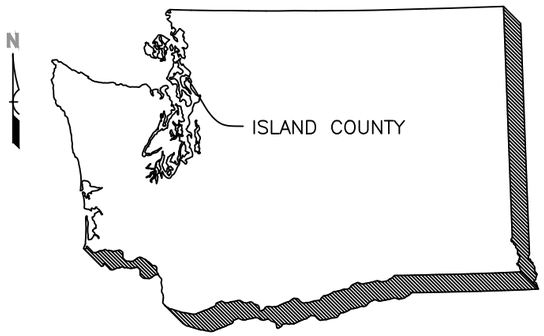
The same table identifies chum as "potentially" covered under the ESA. I am not sure what they mean by that but the table should say "N." "

"I have worked with Jennifer Bailey and am impressed by her commitment to clean water. This is a great study to do although the costs and sources of funding could use some scrutiny. No community issues."

"Not in priority area for Chinook salmon recovery. Explain how benefits salmon recovery better. Is the county providing any matching funds for this work? Application needs to address how this information is going to be shared stored and incorporated into the culvert replacement process and Salmon recovery."

Stakeholder Engagement Summary
March 2014 - June 2016

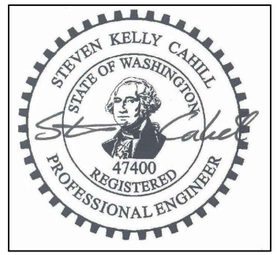
Description/Activity	Date	Summary
Initial landowner meeting	3/10/2014	Initial discussion with Island County about proposed project, site/project history, and design alternatives and contraints.
Project discussion at Island County Salmon Technical Advisory Group	3/19/2014	Discuss project proposal and feasibility; receive feedback on design-build project option.
Concept design review with Island County	4/4/2014	Review concept designs and gather feedback to incorporate into conceptual design for SRFB application.
Salmon Recovery Funding Board (SRFB) 2014 project evaluation tour	4/8/2014	Local and state SRFB reviewers and members of the Island County Water Resources Advisory Committee (WRAC) toured the site and heard a presentation by Snohomish Conservation District (SCD). Tour participants asked questions and provided verbal and written comments (attached) via SRFB review process.
WRAC meeting and public open house	5/8/2014	Presentation to the WRAC followed by public open house; SCD received project feedback from WRAC members; no additional public comment.
Postcard mailing to 163 landowners	6/11/2014	Postcard mailer to surrounding neighborhood landowners to notify them about the proposed project and invite comments (informal).
Site tour with Island Co	3/25/2015	Site tour and review of concept design alternatives; discuss project requirements and constraints
Site tour with Island Co	4/14/2015	Site tour with Director of Public Works
Salmon Recovery Funding Board (SRFB) 2015 project evaluation tour	4/25/2015	Local and state SRFB reviewers and members of the Island County Water Resources Advisory Committee (WRAC) toured the site and heard a presentation by Snohomish Conservation District (SCD). Tour participants asked questions and provided verbal and written comments (attached) via SRFB review process.
Site tour with WDFW	4/29/2015	Site tour with Area Habitat Biologist Paul Marczin and Bob Barnard, PE to discuss conceptual design alternatives, preferred design alternative, and design method. SCD incorporated feedback into preferred design alternative.
Island County Commissioners Work Session	5/6/2015	Project presentation to Island County Commissioners and public attendees to solicit feedback on design alternatives
WRAC meeting and public open house	5/7/2015	Presentation to the WRAC followed by public open house; SCD received project feedback from WRAC members and two landowners in attendence.
Ongoing informal discussions with neighborhood residents	ongoing	During most site visits, interested passersby (vehicle and pedestrian) stop to ask about the project. Informal feedback is gathered in this way and includes many comments about keeping Barnum Road in use for pedestrian and vehicular traffic, comments/observations about flooding over the road, and salmon spotting.



WASHINGTON STATE
N.T.S.

KRISTOFERSON FISH PASSAGE PROJECT
ISLAND COUNTY, WASHINGTON
Triangle Cove, Camano Island, WA 98282
FISH PASSAGE & STREAM CROSSING

PREPARED BY
SNOHOMISH CONSERVATION DISTRICT



Preliminary Plans – 30%

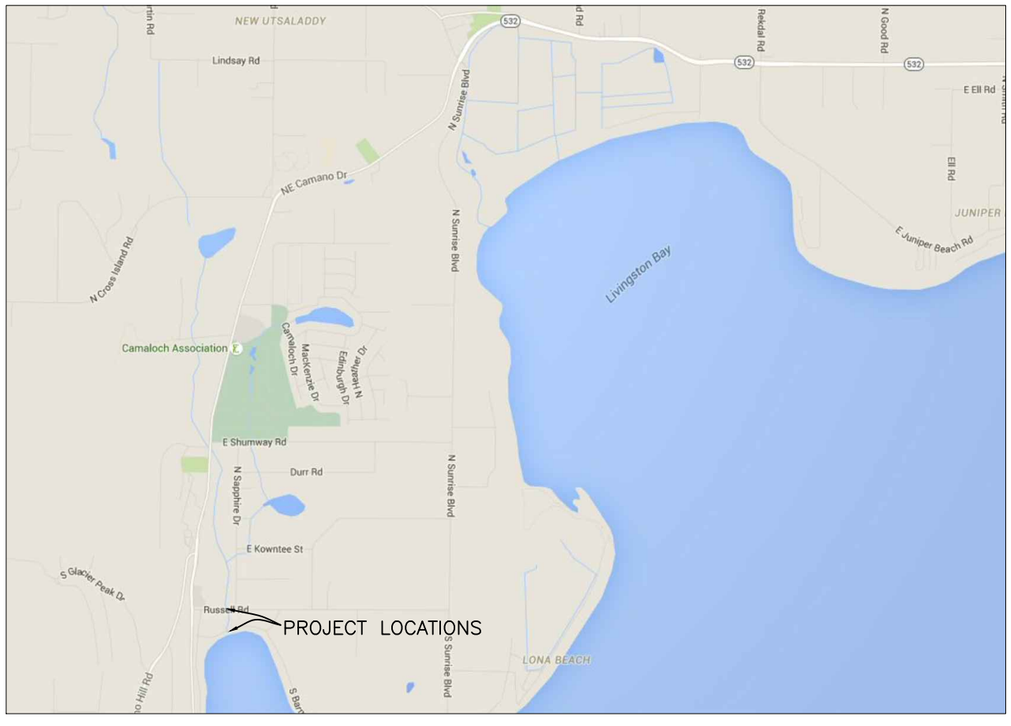
LEGEND

Existing		Proposed
	County Road Edge	
	Access Road	
	Road Centerline	
	Road Surface Rock	
	Culvert	
	Box Culvert	
	Existing Ground (Profile/Detail)	
	Stream Bank	
	Excavation Boundary	
	Hub (Control Point)	
	Q100 (BFE) Boundary	
	Low Flow Channel	
	Contours	
	Shrub Boundary	
	Tree	
	Silt Fence	

LOCATION OF UTILITIES

The Snohomish Conservation District does not make any representation to the existence or non-existence of any public and/or private buried or overhead utilities. Where utilities are shown on the drawing, their location, depth and/or height are approximate. The exact location, depth and/or height shall be determined by the responsible utility. Any construction and/or O&M activities within the utility easement shall be in compliance with the utilities requirements. Call Utility at 1 (800) 424-5555 at least two business days before excavating, as required by Washington State Law.

Vicinity Map (1" = 400')



NOTE: Structural Design of Corrugated Metal Pipe Culvert and Concrete Box Culvert to be Provided By Others.

INDEX OF DRAWINGS

DESIGNED S.K.C. DATE 6/16.
DRAWN S.K.C. DATE 6/16.
DATE
DATE

Project
Kristoferson Fish Passage
Coversheet

SNOHOMISH CONSERVATION DISTRICT

REVISION NO. 1
PROJECT NO.
SHEET 1 OF 10

SURVEY NOTES

1. Survey was performed March 25th, 29th, and April 28th, using a Survey Grade Topcon Hiper GPS receiver to establish vertical control and a Sokkia total station for horizontal control and ground shots.
2. The coordinate system used is Northern Washington State Plane Coordinates, horizontal datum is NAD83(NA2011) epoch 2010.00. Vertical datum is NAVD88 Geoid 12a.
3. This survey is topographic and is intended for use with this project only. This is not a boundary survey. Property and ROW lines have not been determined.
4. Utilities were not examined or considered as part of this survey.
5. Contour Interval, unless noted otherwise, is 1 foot.
6. Establishment of temporary benchmarks (TBM) shall be the responsibility of the Contractor.
7. When moved or damaged, it shall be the Contractor's responsibility to reset any construction stakes set by the Engineer.

CONSTRUCTION SEQUENCE

1. Submit for written approval an anticipated construction schedule to Project Manager at least 1 month prior to start. In–channel work shall occur between July 15th and September 30th, or as allowed by permit conditions.
2. Call for pre–construction meeting with Project Manager, Engineer and Landowner;
3. Establish TBM's and perform construction staking as necessary;
4. De–water and De–fish. De–fishing shall be the responsibility of the contractor.
5. Excavate to place corrugated metal pipe (CMP) and box culvert and re–align stream channel. Install bank armor as necessary.
6. Place CMP and box culvert, while completing finished stream channel through structures. Construct armored banks.
7. Backfill structures and construct road fill. Construct headwalls. Backfill any excavation that is beyond the footprint of the road fill with native material and compact equal with surrounding earth.
8. Incrementally remove sandbag diversion dam, releasing stream water into finished channel. Remove gravity pipe.
9. Apply final soil stabilization applications to all exposed soils within seven (7) days of completing construction activities. Temporary stabilization techniques are required throughout the project in event of rain.
10. Remove all equipment, trash, debris and excess materials from the site within seven (7) days of completing construction activities.

GENERAL CONSTRUCTION NOTES

1. It is the responsibility of the Contractor to comply with local, state and federal law at all times.
2. It shall be the responsibility of the contractor to obtain any required permits not provided by the project manager.
3. The Contractor shall be responsible for complying with all permit terms and conditions.
4. This project shall be constructed to the lines and grades shown in the drawings and detailed in the construction specifications and any specifications included by reference.
5. Quantities may vary based on contractor's choice of construction method.

GENERAL STRUCTURE NOTES

1. Corrugate Metal Pipe shall be pre–manufactured and capable of supporting HS–25 Live Load with the specified depth of fill. Corrugated metal pipe shall be galvanized steel.. Length shall be 66 feet; Diameter shall be 12.0 feet; Thickness shall be a minimium 10–gauge (0.138 inches). Corrugations: 5 inch x1 inch.
2. Corrugated Metal Pipe manufacturer shall provide structure shop drawings and installation directions.
3. Concrete Box Culvert shall be pre–manufactured and capable of supporting HS–25 Live Load with the specified depth of fill. Length shall be 36 feet; Span shall be 12.0 feet and Rise 6.0 feet;
4. Concrete Box Culvert manufacturer shall provide structure shop drawings and installation directions.

DE–WATER/DE–FISH NOTES:

1. Install fish nets and build a sandbag cofferdam at general location as shown. Secure end of gravity diversion pipe near top elevation of sandbag diversion. Install diversion sump for pumping. Slowly draw down water by pumping during installation, in concurrence with de–fishing. Release clean water into the stream channel. Water must be released onto energy dissipating device to avoid scour of channel.

2. Gravity diversion pipe may be buried, or run through the site. However, pipe must be effectively managed during all operations to ensure continuous diversion of water.

3. As needed, use pump to bypass water while repositioning gravity bypass pipe, or during temporary dis–use of gravity by–pass pipe.

4. De–fishing and de–watering shall be maintained for the entirety of the project, or until completion of in–channel work.

5. Groundwater de–watering shall be conducted as needed in conjunction with any excavation. This water shall be considered sediment laden and pumped to a forested location at least 100 feet from the stream, or as necessary to achieve full dispersion of the dirty water on the forest floor.

6. Alternative de–watering plans shall be submitted for conditional written approval by the contract administrator prior to implementation.

EROSION CONTROL NOTES:

1. It is the Contractor's responsibility to ensure no sediment is allowed to enter live water.

2. Prior to construction, assemble erosion control materials onsite. Installation shall be in accordance with manufacturers recommendations, if applicable.

3. Prior to any precipitation, the Contractor must install silt fence at least 50 feet either side of the stream crossing, and along the road edge, or as necessary to prohibit silt laden water from entering the adjacent waterway. This requirement will remain in–force until all project soils are stabalized.

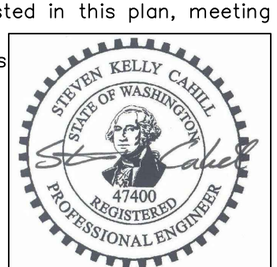
4. At the completion of construction, install coir rolls, silt fence and gabion rock as detailed, to slow water flow and allow sediment deposition. Do Not Remove at completion of operations.

5. At completion of operations, cover all bare soil generated by the project with 6 inches of weed–free straw and grass seed.

6. Once all bare soils are stabilized, temporary silt fencing may be removed.

MATERIAL SPECIFICATIONS

1. Backfill and Bedding Rock, also known as Structural Fill, shall meet either of the following material specification: 9–03.9(1) "Ballast" or 9–03.9(3) "Crushed Surfacing" of the 2012 WSDOT Standard Specifications.
2. Embankment Rock shall be crushed or partially crushed with a minimum percentage of fractured faces of at least 75%, and shall meet the gradation requirements for "Large Jaw Run Rock" or "Small Jaw Run Rock" listed below or 9–03.9(1) "Ballast" or 9–03.14(1) "Gravel Borrow" of the 2012 WSDOT Standard Specifications.
3. Stream rock shall be a custom mixture of rock, in the percentages listed in this plan, meeting the specifications for Streambed Sediment, and Streambed Cobbles, 9–03.11(1) and 9–03.11(2) of the 2012 WSDOT Standard Specifications
4. Earth fill shall meet the material requirements for Common Borrow, section 9–03.14(3) of the 2012 WSDOT Standard Specifications.



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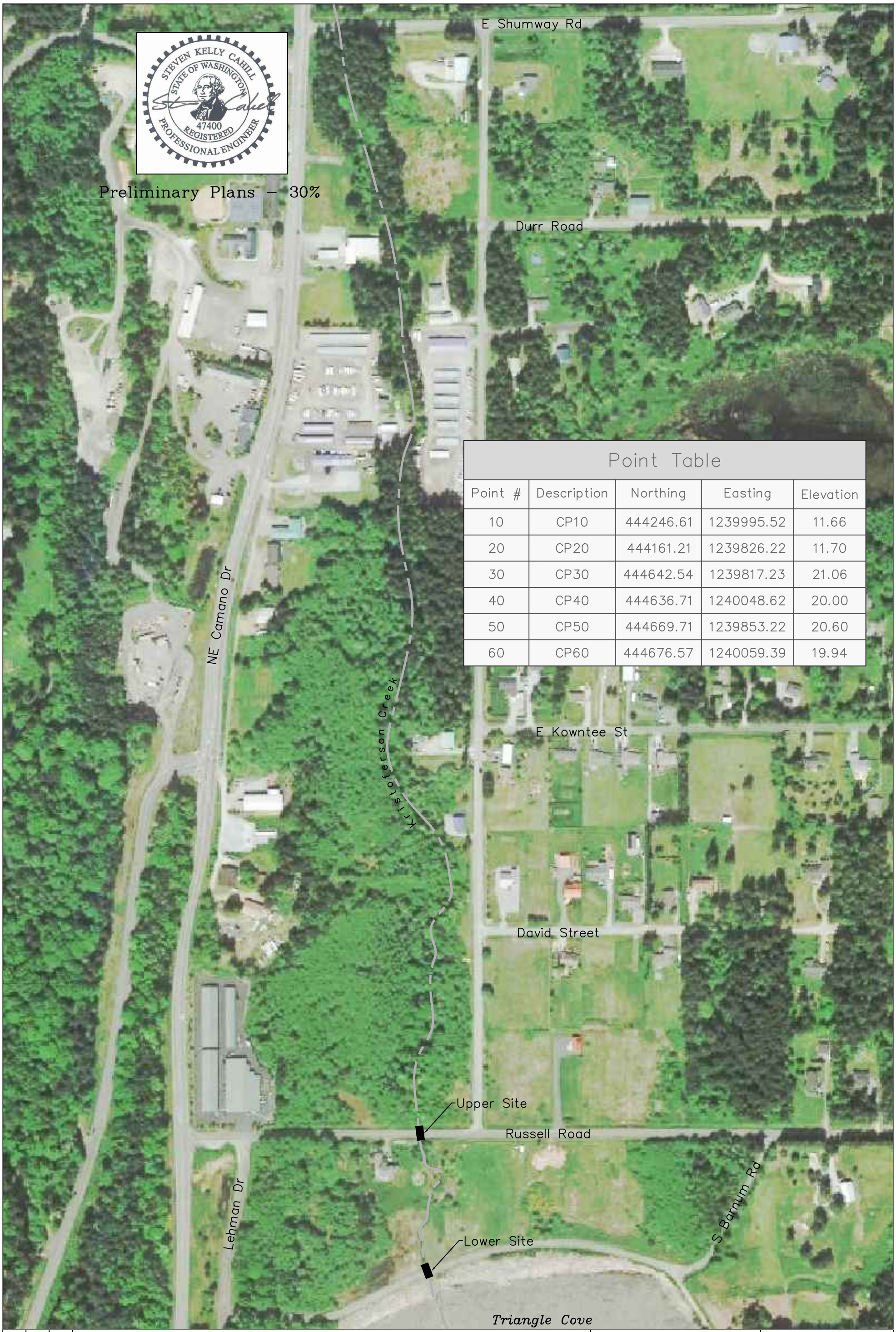
DATE
DATE

Kristoferson Fish Passage Project
Notes

SNOHOMISH CONSERVATION DISTRICT

REVISION NO. 2
PROJECT NO.
SHEET 2 OF 10



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Point Table

Point #	Description	Northing	Easting	Elevation
10	CP10	444246.61	1239995.52	11.66
20	CP20	444161.21	1239826.22	11.70
30	CP30	444642.54	1239817.23	21.06
40	CP40	444636.71	1240048.62	20.00
50	CP50	444669.71	1239853.22	20.60
60	CP60	444676.57	1240059.39	19.94

SHEET 3 OF 10

PROJECT NO. 1

REVISION NO.

Kristoferson Fish Passage Project
Vicinity Map

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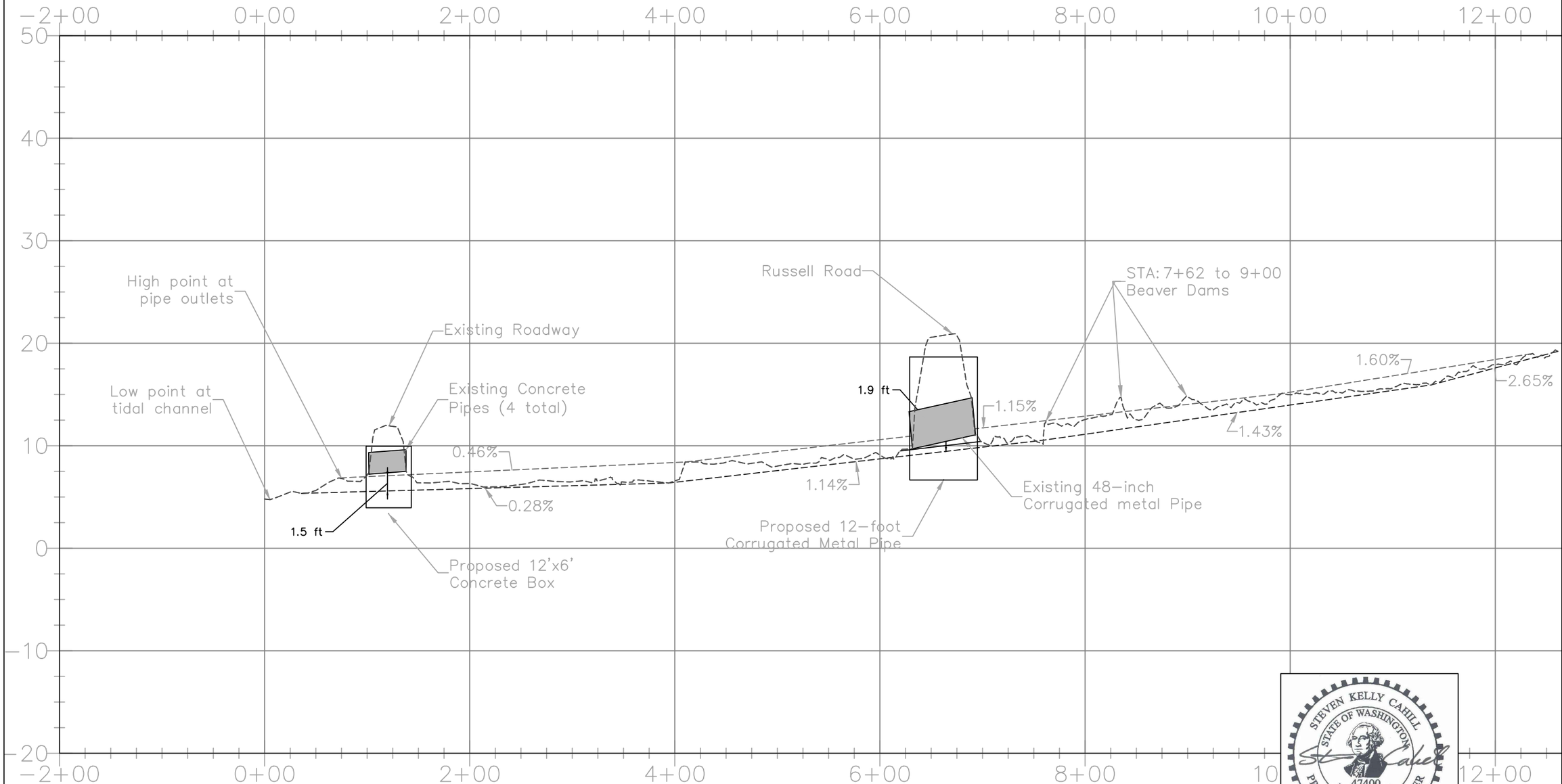
Kristoferson_Creek PROFILE



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Kristoferson Fish Passage Project
Long Profile

SNOHOMISH CONSERVATION DISTRICT

REVISION NO. 1
PROJECT NO.
SHEET 4 OF 10

Base Flood Elevation

Bank Full Width

Kristoferson Creek Centerline

7+00

11.48

11.86

Streambed Simulation Rock

CP50

Limits of Excavation

Match existing pavement, shoulder widths and fill slopes

RUSSELL ROAD

10+00

Edge of pavement

12ft dia, 10ga, Corrguated Metal Pipe

12.14

11.92

6+00

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Kristoferson Fish Passage Project
Upper Site – Plan View

SNOHOMISH CONSERVATION DISTRICT

SHEET 5 OF 10

PROJECT NO.

REVISION NO. 1

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DATE

DATE

NOTES:

1. Saw–cut pavement prior to excavation.
2. At the contractor's discretion, benching may be utilized for equipment access and construction needs.
3. Stream simulation rock mix shall be in accordance with section 9–03.11, 9–03.11(1) and 9–03.11(2) of the 2012 WSDOT Standard Specifications.

Structure Section
Russell Road Centerline

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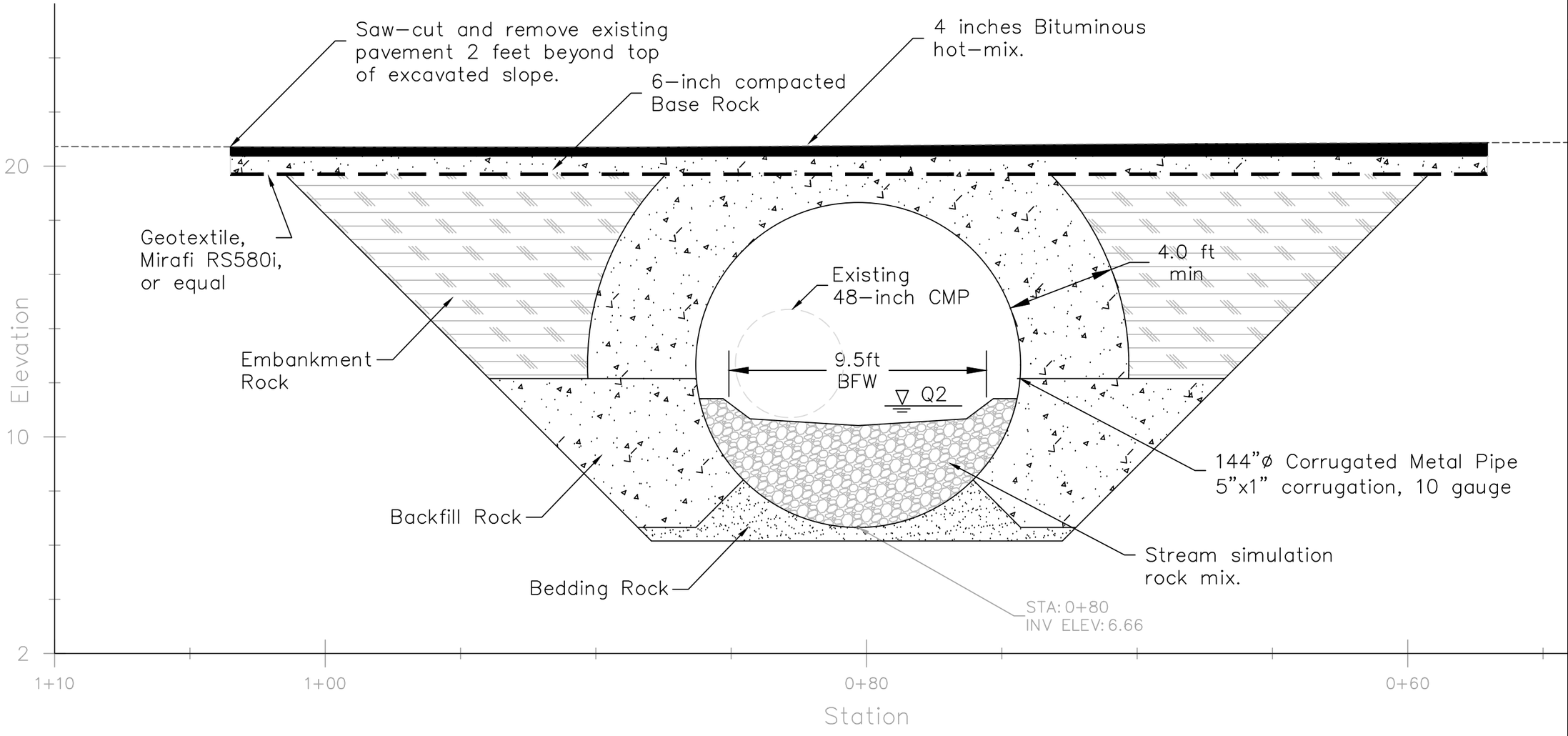

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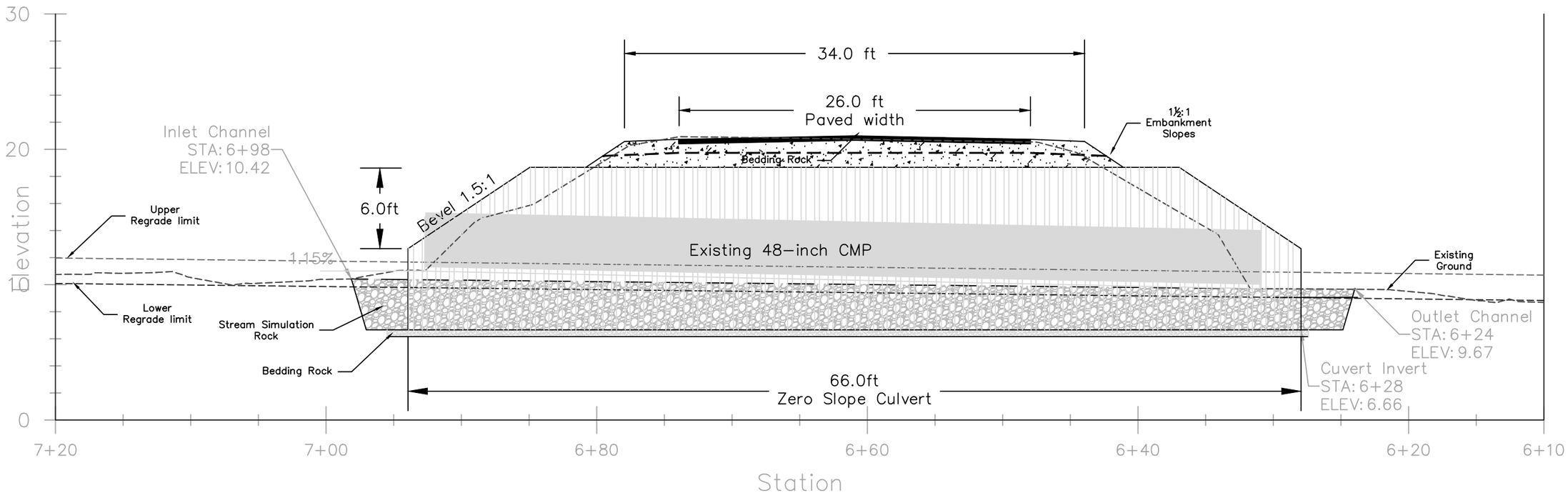
Kristoferson Fish Passage Project
Upper Site – Section View

SNOHOMISH CONSERVATION DISTRICT

REVISION NO. 1
PROJECT NO.
SHEET 6 OF 10

Structure Section
Russell Road Centerline



NOTES:

1. Specified Corrugate Metal Pipe is an 10 gauge (.138 Inch Thickness) corrugated steel pipe, with nominal diameter of 12 feet. Corrugations are 5”x1” or 3”x1”. End treatments shall include a 6 ft step and 1½:1 bevel. Total length is 66 feet.
2. Existing ground shall be excavated a minimum 1 foot, compacted, and backfilled with bedding rock prior to placement of pipe.
3. All backfill, bedding shall be compacted 95% Relative Density. Embankment Rock, Surface Rock, Earth Fill and waste sites shall be compacted as specified in the specifications.
4. Contractor shall work with utility provider to route any underground utilities in conjunction with road construction.

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Kristoferson Fish Passage Project
Upper Site – Profile

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REVISION NO. 1
PROJECT NO.
SHEET 7 OF 10

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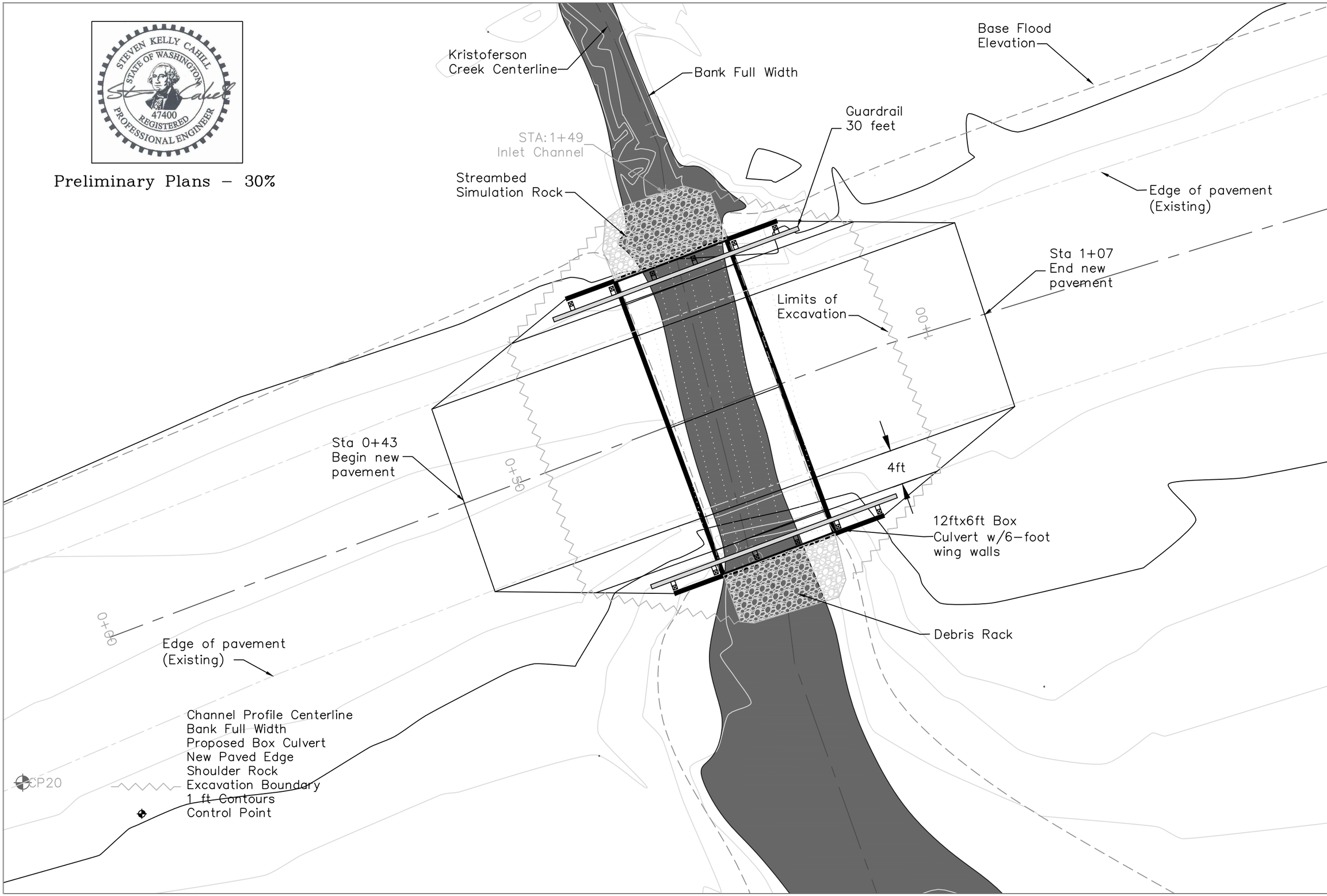

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Kristoferson Fish Passage Project
Lower Site – Plan View

SNOHOMISH CONSERVATION DISTRICT

REVISION NO. 1

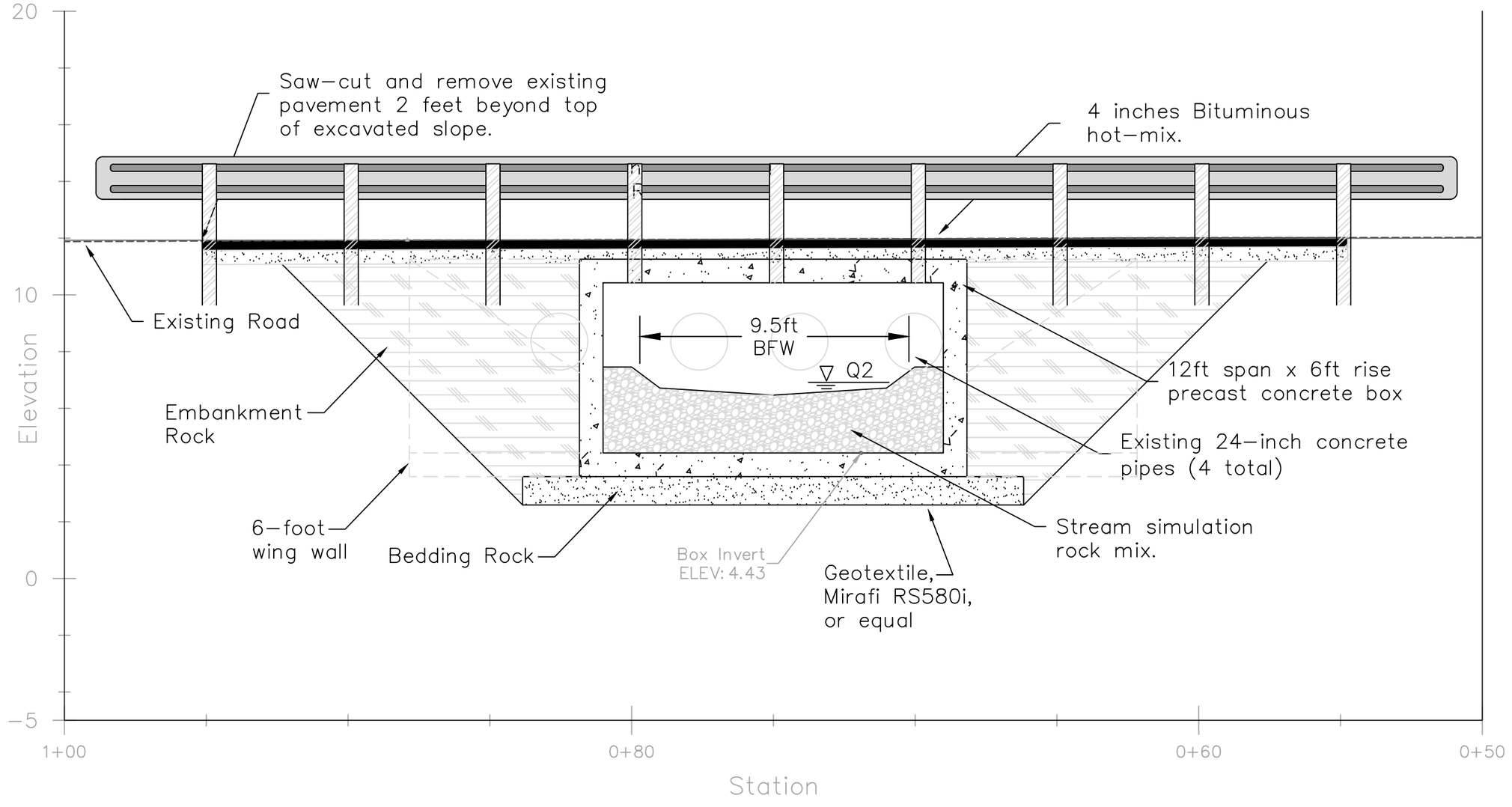
PROJECT NO.

SHEET 8 OF 10

NOTES:

1. Saw–cut pavement prior to excavation.
2. At the contractor's discretion, benching may be utilized for equipment access and construction needs.
3. Stream simulation rock mix shall be in accordance with section 9–03.11, 9–03.11(1) and 9–03.11(2) of the 2012 WSDOT Standard Specifications.

STRUCTURE SECTION
LOWER ROADWAY



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Kristoferson Fish Passage Project
Lower Site – Section

SNOHOMISH CONSERVATION DISTRICT

REVISION NO. 1
PROJECT NO.
SHEET 9 OF 10

NOTES:

1. Specified Pre–cast Concrete Box Culvert has an interior span of 12 feet and an inside height of 6 feet. Total length is 36 feet.
2. Existing ground shall be excavated a minimum 1 foot, compacted, and backfilled with bedding rock prior to placement of pipe.
3. All backfill, bedding shall be compacted 95% Relative Density. Embankment shall be compacted as specified in the specifications.
4. Contractor shall work with utility provider to route any underground utilities in conjunction with road construction.

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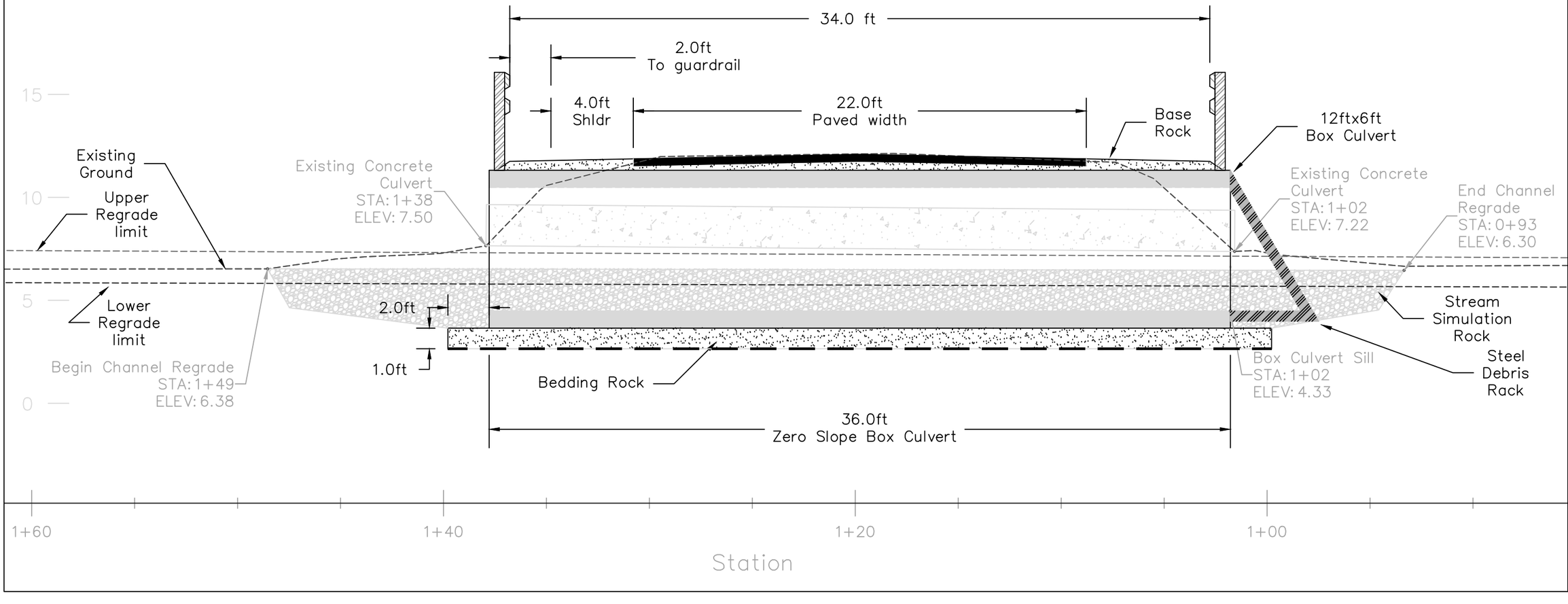
STRUCTURE SECTION
LOWER ROADWAY



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Kristoferson Fish Passage Project
Lower Site – Profile

SNOHOMISH CONSERVATION DISTRICT

REVISION NO. 1
PROJECT NO.
SHEET 10 OF 10

Kristoferson Creek Fish Passage Inmprovements Project 15-1050
Preliminary Cost Estimate

Project Name: Upper Site - Russell Road Crossing
Date: 7/15/16
Estimate By: K Cahill
Stream: Kristoferson Creek
Proposed Correction: 12-foot Dia 10ga CMP

Description	Unit	Quantity	Cost	Amount	Sub Total	
Mobilization / Site Preparation						
Mobilize	L.S.	1	$5,000.00	$5,000		
Access	L.S.	0	$0.00	$0		
Traffic Control	L.S.	1	$2,500.00	$2,500		
Erosion Control	L.S.	1	$1,500.00	$1,500		
Dewater	L.S.	1	$1,500.00	$1,500		
Fish Removal	L.S.	1	$500.00	$500		
Utilities		1	$0.00	$0		
MOBILIZATION / SITE PREP SUB TOTAL					$11,000	
Excavation						
Excavation, Common	C.Y.	617	$8.00	$4,936		
Excavation, Channel	C.Y.	161	$9.50	$1,530		
Excavation Disposal	C.Y.	250	$15.00	$3,750		
Rmv. & Disp. Culvert	L.S.	1	$1,250.00	$1,250		
EXCAVATION SUB TOTAL					$11,466	
Culvert Installation						
Streambed Gravel	C.Y.	45	$75.00	$3,375		
Culvert, 12-ft, 10ga, beveled ends	L.F.	66	$485.00	$32,010		
Install Culvert	L.S.	1	$2,250.00	$2,250		
Backfill,Bedding	C.Y.	49	$65.00	$3,185		
Backfill, Select, Compaction	C.Y.	320	$60.00	$19,200		
Backfill, Common, Compaction	C.Y.	290	$30.00	$8,700		
Road Base Rock	C.Y.	155	$60.00	$9,300		
Resurface, HMA class 1/2"	Ton	32	$150.00	$4,800		
Permitting SCD Staff time	L.S.	1	$1,470.00	$1,470		
Staging Area Remediation	EA	1	$2,500.00	$2,500		
CULVERT INSTALLATION SUBTOTAL					$86,790	
Channel Work						
Excavation, Channel	C.Y.	0	$0.00	$0	Included above	
Grade Controls	L.S.	0	$0.00	$0		
Subgrade Material	C.Y.	0	$0.00	$0		
Streambed Material	C.Y.	112	$95.00	$10,640		
Restoration	L.S.	1	$2,600.00	$2,600		
Habitat Features	L.S.	0	$0.00	$0		
LWD	EA.	0	$0.00	$0		
CHANNEL WORK SUBTOTAL					$13,240	
CONSTRUCTION TOTAL					$122,496	
Sales Tax	8.60%				$10,535	Enter % in highlighted cell
Permit fees					$0	
Geotechnical Investigations					$0	
Soils Lab Testing					$0	
PROJECT TOTAL					$163,630	

Kristoferson Creek Fish Passage Improvements Project 15-1050
Preliminary Cost Estimate

Project Name: Lower Site - Barnum Road
Date: 7/15/16
Estimate By: K Cahill
Stream: Kristoferson Creek
Proposed Correction: Precast concrete box culvert, 12x6, 36 feet long

Description	Unit	Quantity	Cost	Amount	Sub Total	
Mobilization / Site Preparation						
Mobilize	L.S.	1	$0.00	$0	Included in Upper Site	
Access	L.S.	0	$0.00	$0		
Traffic Control	L.S.	1	$1,500.00	$1,500		
Erosion Control	L.S.	1	$1,500.00	$1,500		
Dewater	L.S.	1	$1,500.00	$1,500		
Fish Removal	L.S.	1	$500.00	$500		
Utilities		1	$0.00	$0		
MOBILIZATION / SITE PREP SUB TOTAL					$5,000	
Excavation						
Excavation, Common	C.Y.	203	$8.00	$1,624		
Excavation, Channel	C.Y.	127	$9.50	$1,207		
Excavation Disposal	C.Y.	250	$15.00	$3,750		
Rmv. & Disp. Culvert	L.S.	1	$2,250.00	$2,250		
EXCAVATION SUB TOTAL					$8,831	
Culvert Installation						
Streambed Gravel	C.Y.	75	$75.00	$5,625		
Box Culvert, 12x6, 36 feet	L.F.	36	$700.00	$25,200		
Install Culvert	L.S.	1	$10,500.00	$10,500		
Guard Rail	L.S.	1	$3,500.00	$3,500		
Backfill,Bedding	C.Y.	49	$65.00	$3,185		
Backfill, Select, Compaction	C.Y.	0	$60.00	$0		
Backfill, Common, Compaction	C.Y.	170	$30.00	$5,100		
Road Base Rock	C.Y.	25	$60.00	$1,500		
Resurface, HMA class 1/2"	Ton	25	$150.00	$3,750		
Permitting SCD Staff time	L.S.	1	$1,470.00	$1,470		
Staging Area Remediation	EA	1	$2,500.00	$2,500		
CULVERT INSTALLATION SUBTOTAL					$62,330	
Channel Work						
Excavation, Channel	C.Y.	0	$0.00	$0	Included above	
Grade Controls	L.S.	0	$0.00	$0		
Subgrade Material	C.Y.	0	$0.00	$0		
Streambed Material	C.Y.	75	$95.00	$7,125		
Restoration	L.S.	1	$2,600.00	$2,600		
Habitat Features	L.S.	0	$0.00	$0		
LWD	EA.	0	$0.00	$0		
CHANNEL WORK SUBTOTAL					$9,725	
CONSTRUCTION TOTAL					$85,886	
Sales Tax	8.60%				$7,386	Enter % in highlighted cell
Permit fees					$0	
Geotechnical Investigations					$0	
Soils Lab Testing					$0	
PROJECT TOTAL					$123,872	